JUN 4, 1951

X

STEEL

The Weekly Magazine of Metalworking

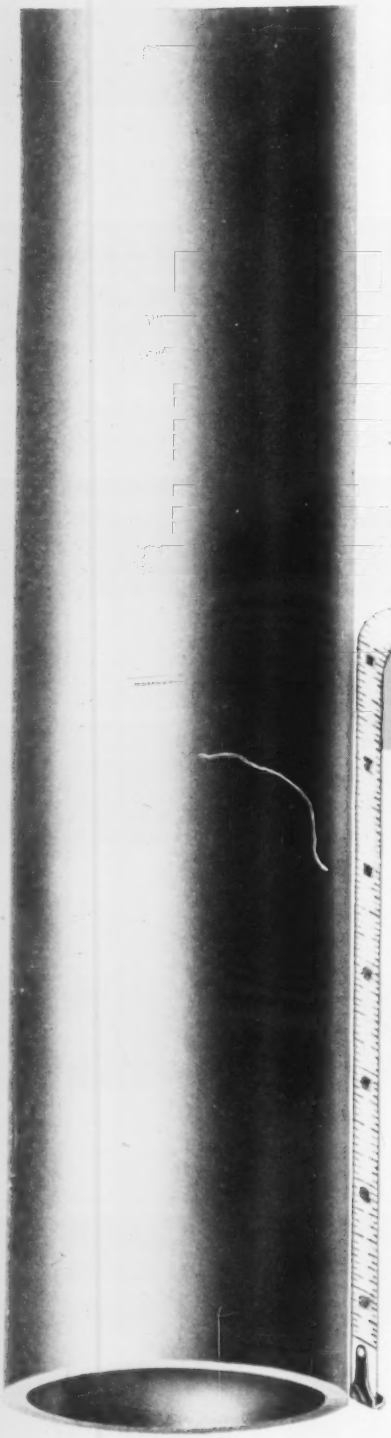
UNIV. OF MICHIGAN
JUN 4 1951
EAST ENGINEERING

WANTED: MORE PIG IRON

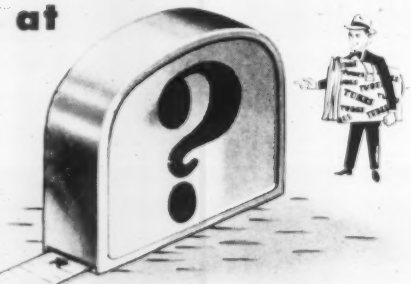
—see page 182

60 000 Aircraft Suppliers—But More Needed, p. 59

Metal Spinning: A Mass Production Tool, p. 88



Let's take a Closer Look at



tubing length

Here are the different kinds of length you can specify for all B&W Mechanical Tubing. Remember, as you go *down* the following list, the *price* generally goes down.

CUT LENGTH: close plus tolerance on a specified length; base price on lengths 10-24 feet . . . cut-lengths over 24′ and under 10′ cost more.

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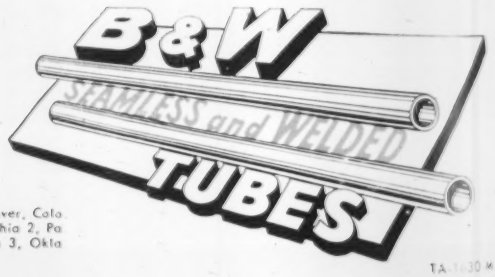

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STEEL
The Weekly Magazine of Metalworking

VOL. 128 NO. 23 JUNE 4, 1951

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Next Week . . . **Mapping a Global Congress on Metallurgy . . . Incentive Handling System Ups Production 25% . . . Breeding Ground for Navy's Firepower . . . Sponge Iron a Remedy for Scrap Shortage?**

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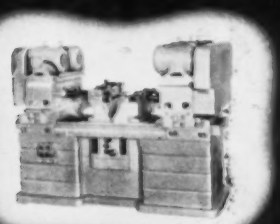
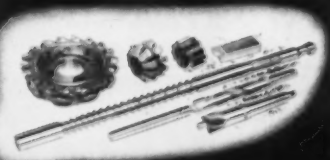
EX-CELL-O for PRECISION



PRECISION MACHINE TOOLS



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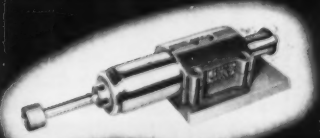

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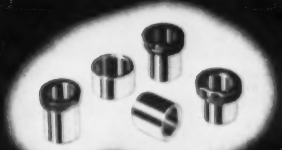

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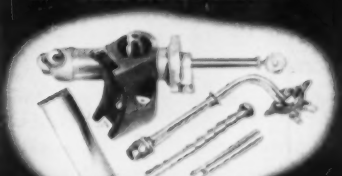
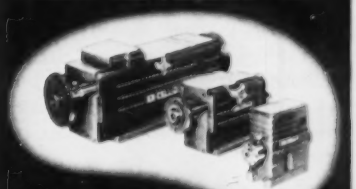


AIRCRAFT AND PRECISION PARTS



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Behind the Scenes . . .

Russian Censorship

Circulation Department Manager Rand Ebersole has just received a letter from a Viennese company that must be in the Soviet sector of that city. The envelope had been opened by a censor. As we understand it, the Russians are the only ones that still practice censorship in Vienna. The censor's stamps appear both inside and outside the envelope. Thorough, those Russians.

Some time ago, STEEL discontinued all its circulation in Communist countries.

Elephants vs. Machines

ECA has a rugged problem on its hands. It's trying to decide whether the elephant and the water buffalo are more efficient than modern machinery in Burma's lumbering industry. The agency is considering sending one or two sets of mechanical extraction outfits to Burma to pit them against the animals.

We're glad to report that the Burmese elephant's life span is about the same as that of a man in that part of the world. When he is 5 years old, his training begins, and soon he starts to carry light loads. He is gradually given harder jobs until he is 18 when he is capable of doing the heaviest work—dragging logs. He is capable of hard labor for about 15 years. After that, he is put on lighter work for another 15 years. A few years past the age of 52 he is apt to be retired.

Elephants do not like to work in the hot sun, but are especially adapted for working in the shade of the forests. They are worked for five days, then allowed to rest two. Usually they are not worked in the latter part of March and April, the hottest months, but are sent to a rest camp. They also are given about two weeks' vacation again in October.

Those elephants must have a strong union.

Soapbox Corner

We're all for reform in a number of little business practices.

One involves the getting-on and getting-off of elevators. If you let women get on first, they of course are at the rear of the elevator. When both men and women are getting off at a stop, the absurd courtesies about letting the fair sex off first mean that there is a great deal of stepping on toes as the men huddle to the sides of the cars to let them off. We have even seen this height of absurdity: A man had to get off first because there were nothing but men at the front of the elevator. He stepped out and waited as if he were going to get back into the elevator. But no, he merely waited until the women struggled off and then continued down the corridor after them on his separate way.

We say: Let women get on elevators first, but the one nearest the door should get off first regardless of sex. We were delighted to see a sign to that effect in the elevators of the Cleveland Electric Illuminating Co. First ones we have ever seen.

Another matter also needs a little airing. Every once in a while we pick up our ringing phone to be told by a woman that Mr. So-and-So is calling. We wait, doodle on the blotter, shift around in our chair. Usually Mr. So-and-So finally gets on the phone, but sometimes the secretary returns and not-too-apologetically explains that her man has "stepped out." By that time, we are often ready to jam the phone down her or Mr. So-and-So's throat.

Promising

You will recall that on May 7 we ran a plaintive note lamenting the misunderstanding that has temporarily brought a coolness between ourselves and Geraldine, a cleaning woman in our building and our night editor.

We're delighted to report that the ice is breaking—but slowly. We had on our desk a picture of the buxom Dagmar, TV performer who has just been voted Miss Welder of 1951. The other morning we found that Geraldine, who detests such pictures, had scrawled across it: "Mr. Shrdlu ! ! !"

Puzzle Corner

We went to press on this page too early (Memorial Day scrambled our printing schedules) to have received any answers to the May 21 puzzle about the penny pitchers. Here's the answer: At the end of the game Art has 29, Bob 55, Charlie 127 and Dave 29 pennies.

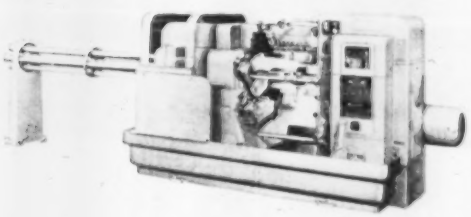
An unscrupulous woman and a gullible one together prepared an 8-inch ball of yarn. Upon dividing it, the first woman wound the yarn off into a skein until the remaining ball was 4 inches in diameter. When she got home, she wound her yarn into a ball. What was its diameter and what per cent of the whole did each woman get?

Shrdlu

(Metalworking Outlook—Page 51)

One answer to the manpower shortage

THE WARNER & SWASEY 5-SPINDLE AUTOMATIC

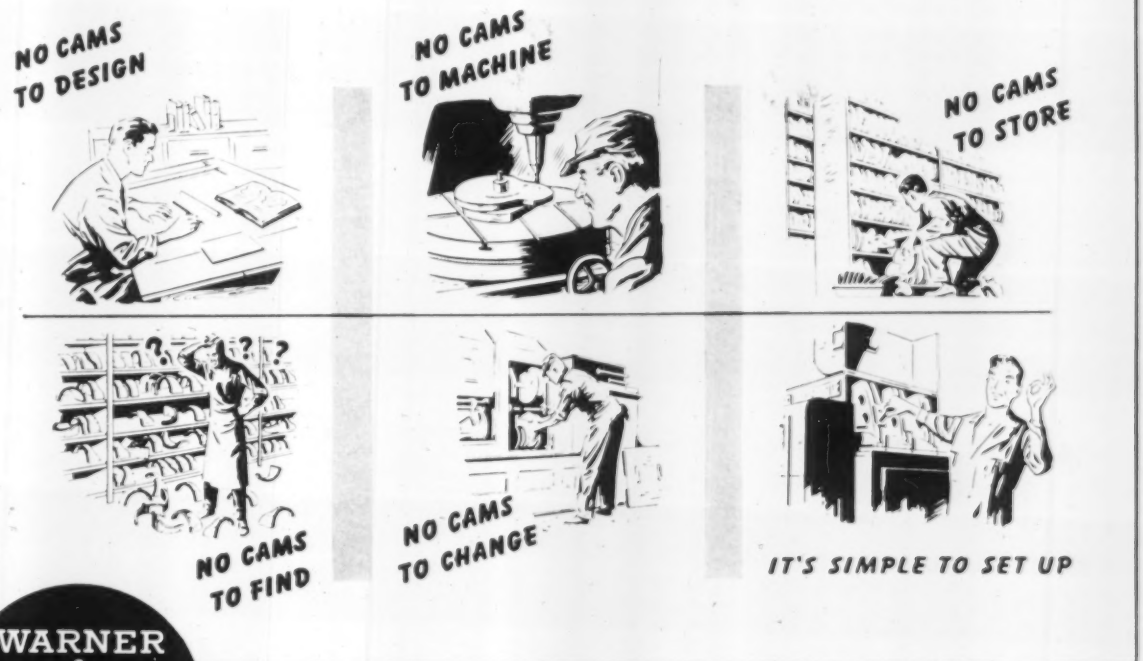


THIS NEW automatic machine, with its advanced *camless* design, helps answer one of the biggest problems facing industrial management today—the problem of increasing production in the face of today's tight manpower market.

In many cases, one 5-Spindle Automatic is out-producing five or six manually operated machines—and one man can operate two of these automatics!

And setup is simple and quick—averaging 4 or 5 hours for a completely new setup—making these machines ideal for short and medium lot runs.

Think of the savings in time and cost from this one feature alone . . . NO CAMS TO CHANGE.



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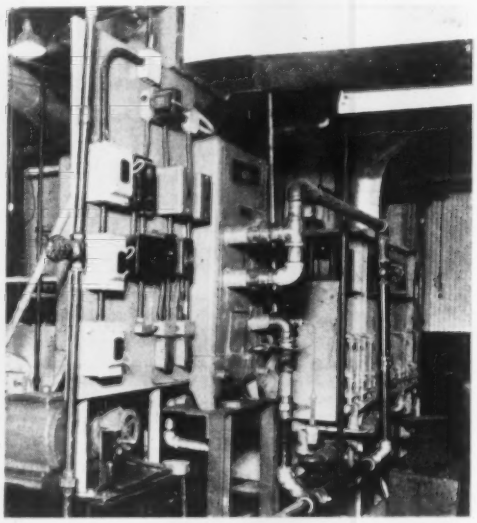
Improve Quenching and You Get Better Heat Treating

Your Department can have a better arrangement with Niagara Equipment that saves much space and increases your production.

This quench bath cooler gives you control of temperature and pays for itself quickly with water savings



● The NIAGARA AERO HEAT EXCHANGER transfers the heat from the quench bath to atmospheric air by evaporative cooling. It never fails to remove the heat at the rate of input, giving you real control of the quench bath temperature. This prevents flashing of oil quenches. In all cases it improves physical properties, saves loss of your product from rejections and gives you faster production, increasing your heat treating capacity. You can put heat back into the quench bath to save the losses of a "warm-up" period.

Savings in piping, pumping and power as well as great savings in cooling water return the cost of the equipment to you in a short time. The Niagara Aero Heat Exchanger saves nearly all of the water consumed by conventional cooling methods.

For the complete story of other benefits and savings, write for Bulletin 96.

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LETTERS

TO THE EDITORS

Advertising Included

What precedents have been established by the government and manufacturers on the question of including advertising as an item of cost in negotiated government defense contracts?

Arnold W. Mo...
Nelson-Wa...
Minneapolis

● *Rules governing industrial advertising expenditures are essentially the same as in World War II. Bureau of Internal Revenue treats such expenditure for tax purpose just as it has since 1942. General rule is: All legitimate advertising is necessary business expense and will be allowed. For renegotiation, the rule is similar to that of the Bureau of Internal Revenue.*

'An Excellent Comparison'

Your 26th annual financial analysis of the steel industry (supplement, Apr. 30) if of special interest and presents an excellent comparison of the various steel companies.

Robert A. Williams
A. E. Masten & Co.
Pittsburgh

Autos and Construction

Do you have figures detailing dollar value of steel used by the automotive and building construction industries in an average production period, plus the per cent of total yearly steel output used by these industries?

J. Robert Hoff
The Ballantyne Co.
Omaha, Nebr.

● *Tonnage consumption of steel in 1950 by automobile and building construction industries is carried in* STEEL, *Apr. 16, pp. 54-55. For dollar value involved, use the price composite on page 128 of that issue.*

More 'Steel Statistics'

STEEL published a pamphlet, "Steel Industry Statistics," in the issue of November 29, 1948, covering U. S. capacity for production of pig iron, steel, coke, etc. Do you have statistics to bring this information up to date?

G. G. Coolidge
Harbison-Walker Refractories Co.
Pittsburgh

● *Up-to-date statistics on the steel industry are being compiled now by* STEEL. *We will publish these within the next several months.*

Boron: The Japanese Report

STEEL's item, "Nitrogen Tames Boron," is of great interest to us. Please advise how we may obtain a copy of the report by the Japanese metallurgists to which the item refers.

Gladys D. Kile, advertising manager
Vanadium Corp. of America
New York

● *Report was titled "An Investigation on Boron-Treated Medium Steels," by Y. Imai and H. Imai and was reprinted from the Tohoku University science report in the April, 1951, issue of "The Engineers' Digest," 120 Wigmore St., London W. 1.*

STEEL

The Metalworking Outlook

June 4, 1951

50,000 CMP Requests

Some 50,000 applications to receive steel, copper and aluminum under the Controlled Materials Plan were filed by the May 31 deadline. CMP officials will act on the majority of them by the middle of June. If you couldn't make the deadline, file anyway. Your application will still be acted upon, but you will have to wait until all the requests ahead of you get attention.

Gray Market In Steel: Still Small

Steel shortage notes: The gray market is on the increase, but it's still a very minor factor in total steel procurement . . . Republic Steel Corp. shipments for defense and defense related industries will increase to between 50 and 55 per cent in the third quarter from the current 40 per cent rate . . . R. G. LeTourneau Inc., earthmoving equipment maker, has started building its own electric steel plant at Longview, Tex., where by the end of the year it expects to turn out 1000 tons of steel plate a day; the facility will consist of two electric furnaces and a complete rolling mill.

The Plateau Continues

This second quarter promises to be the year's low in business activity, although sales are still far higher than in the second quarter of 1950. A drop in sales and new orders is especially marked in consumer durable goods, and the lag there has been partly but not completely made up in other lines. Manufacturers' April shipments were down 5 per cent from March, but a third larger than a year ago. New orders placed with manufacturers in April were 17 per cent less than in March, but some 60 per cent of the decline represented a seasonal movement. In June, expect a continuation of the April-May plateau in business activity.

Will Razzle-Dazzle Pay Off?

Pressure is on in government circles for high powered bond drives in industrial plants such as were common during World War II. Washington needs the money, and heavy bond sales serve as a good inflationary curb. Some Treasury people are hesitant, want to go along with the moderate sales campaign now in progress. They point out that a razzle-dazzle—and costly—program of World War II proportions could not produce the old results because the bond-buying market is already partly sold.

The Purse Strings Tighten

If you want to borrow money, you may have more trouble than 60 or 90 days ago. The Federal Reserve Board's voluntary credit restraint program inaugurated in March is beginning to work. The program would encourage straight defense credit, but discourage loans to carry raw commodities and retail inventories. The first two phases of the scheme are working out, but retail inventory credit

Production-Engineering News—p. 87 The Market Outlook—p. 163

continues to climb. FRB people think even retail inventory credit will slacken soon. FRB is briefing the 90,000 U.S. lenders on the kind of loans to make.

Railroads Return to Banks

Railroads are considered a first-rate defense borrower. Good banking terms for the carriers have meant the death—or at least the shelving—of the insurance company financing of freight car purchases that created a stir in 1949. Under that scheme, insurance companies would buy cars and lease them to the roads. Railroads have returned to conventional banking methods of financing. Little more than 20,000 cars have been purchased under the leasing program since it was announced, and only about ten railroads used the scheme.

Regulation W Changes Urged

Watch for some modification in Regulation W—FRB's installment buying curb. Automotive people want credit extended 18 months, not the 15 months presently allowed, with the consequent lower down payment. Detroit advances this argument: Regulation W will stem inflation only slightly, but it may contribute to greater materials shortages. Why? Because the credit ruling automatically forces automakers to cater to the class market where such curbs mean little, and that results in production of the bigger, materials-devouring autos.

Automakers Try Again

Automakers are renewing their onslaught on Washington for more price relief. In petitioning the Wage Stabilization Board for approval of the four-cent-an-hour wage increase due their workers as the annual improvement factor, leading car producers are taking the opportunity to sound off against what they charge has been price discrimination. The only real relief that any has won came last week when Chrysler was allowed to increase the price of three models, all with the new V-8 engine, by $251 to $261.

Straws in the Wind

The government will permit more tin to be used for canning certain types of dry and powdered milk . . . Artificial graphite will come under allocation July 1 . . . U.S. Steel Products Co. has bought 23 acres near Camden, N. J., for eventual construction of a steel container plant . . . Surprise resignation of Fowler McCormick as chairman of International Harvester Co. makes President John L. McCaffrey chief executive officer . . . The corporate shift which will make Carboloy Co. Inc. the Carboloy Department of General Electric Co. on June 30 will mean expansion of its activities . . . Westinghouse plans a jet engine parts plant at Columbus, O.

What Industry Is Doing

The aircraft industry is using 60,851 subcontractors and suppliers—but needs more (p. 59) . . . You may have to divvy up on scarce American raw materials with other users in the free world (p. 61) . . . Commercial shops will produce an estimated 1,250,000 net tons of drop and upset forgings in1951 (p. 62).

Bending to Other Forces

Since the annual meeting of the American Iron and Steel Institute ten days ago much discussion has centered upon statements of several steelmakers that the time when steel supply will satisfy demand is nearer than is generally realized. They believe this important date may come before the end of the year.

Predictions of this kind have to be based upon certain assumptions. One is that reductions in steel consumption for civilian use will proceed as planned by government agencies. Another is that the "take" of steel for defense will adhere closely to the government's program. On the basis of these assumptions, nobody can take violent exception to the steelmakers' predictions.

However, these assumptions—plausible as they appear to be—overlook one unfortunate fact. The administration in Washington is not in a position to guarantee that its plans can be carried out according to present schedules. On the international front, the decisions of our government have to be improvised to suit whatever actions Joe Stalin may take rather than be based upon our own choice. This is a deplorable situation and it has been made worse by the consistent "scare" and "fear" tactics of our government. Administration leaders have exaggerated the Russian potential and minimized our own to a ridiculous extent. They have exploited the doctrine of fear to force Congress and the public to approve dangerous extensions of government authority.

A similar situation exists on the home front. While President Truman did make a stand against too much domination of government by union minorities, apparently he has capitulated to their pressure. As a result, many decisions which should be made by the President and his cabinet actually are dictated by union chieftains. Evidence of this is found in the debauchery of the wage stabilization program and in the recent turn in income tax proposals.

Thus in affairs abroad and at home, decisions which may easily determine when steel supply will overtake demand will be made not by a strong government acting on its own initiative but by a weak government bending to the initiative of other strong forces.

E. C. Shaner

EDITOR-IN-CHIEF

BONANZA FOR SMALLS: Aircraft manufacture for the current defense program offers much more opportunity for small subcontractors than did the plane schedules of World War II. The principal reason for this is found in the radically changed characteristics of aircraft manufacture since the early forties. Today considerable emphasis is placed upon jet engines, electronics systems for airplanes and armament and weapons for aircraft. These represent the major changes in the present program from that of the last war. At the same

time, they provide the best chances for newcomers to get in on subcontracting.

About $26 billion for aircraft procurement has been appropriated or requested for 1951 and 1952. Half of this will go to subcontractors and suppliers. Today aircraft manufacturers are employing 60,851 subcontractors and suppliers and are seeking more. Here is opportunity. To capitalize on it, apply to prime contractors with convincing data of what your plant can do. —p. 59

FOR BETTER PLUMBING: An item in "Windows of Washington" lists six research projects under contract by the Housing & Home Finance Agency. It is significant that two of the six deal with plumbing. Bureau of Standards is exploring "possibilities for improving conventional household plumbing systems" and University of Illinois is seeking "less complicated and more economical residential plumbing systems than those conventionally in use."

Anyone who has lived long in his own house and recently has built or moved into a new house will understand the merit of these projects. New equipment such as lavatories, tubs, sinks and toilets represents some improvement over the old but their connections and fittings, in many instances, are as much subject to mishap or failure as were their prototypes three or four decades ago. We hope the researchers find simple plumbing gadgets that will work. —p. 66

SIGNS OF THE TIMES: Champion Spark Plug Co. laid off 2500 employees because expected steel was not delivered. Three steelworks in South Wales will close down because of lack of scrap. Ingersoll Products Division of Borg-Warner shuts a plant because of restrictions on aluminum. Survey of 3000 shops in San Francisco area shows that those employing five to 25 persons are operating at an average of less than 50 per cent of capacity and "face complete shutdowns unless relief is obtained in subcontracting for defense purposes." Coal shortages are forcing a decline in output of Australian steel. Production at two new modern American automatic transmission plants is held to less than 50 per cent of capacity by restrictions on aluminum and copper.

These and other curtailments reported in this issue are the inevitable results of world-wide attempts to superimpose a heavy armament program upon an economy enjoying a record-breaking civilian demand. Unfortunately hardship cases will increase before they diminish. —pp. 69, 70, 73

90 MILLION IN 1975: Economists in the Department of Labor estimate that the nation's labor force will total 90 million by 1975. Their projections are based upon a continuance of an economy without major war, continued high birth rates throughout the present decade and an extension of past trends in the degree of work participation among men and women of different age groups.

To attain a total of 90 million gainfully employed by 1975 means that the working force must increase by an average of a million a year. Although annual growth will fluctuate widely, it is likely this average can be achieved. The prospect of 90 million persons working at good wages has great economic significance. Our manufacturing system is designed to provide more goods for more people at lower prices. The economists' projections envision an attractive market for this objective. —p. 70

MORE THAN NET TONS: So much emphasis has been placed upon the quantitative aspects of the steel industry's expansion program that some important qualitative factors may be overlooked. It is easy to state the dimensions of physical expansion in definite terms of increase in net tons of ingot capacity. It is almost impossible to visualize clearly what the new facilities will mean in terms of greater efficiency and better quality of products.

Some hints of these potentials were heard at the meetings of the American Iron & Steel Institute in New York and the Association of Iron & Steel Engineers in Detroit. The president of the latter organization declared that "new and ingenious ideas for equipment, better production techniques and improved maintenance practices are reflected in the industry's greater capacity for production."

The important thing to remember is that these advances represent our chief hope for increased productivity, without which the industry's five billion dollar investment in expansion since 1946 could not be fully justified. —p. 101

Needed: More Aircraft Suppliers

Some 60,000 are already participating, but there's opportunity for even more, particularly to supply parts for jet engines, electronics systems and weapons

THE NATION'S aircraft industry is using 60,851 subcontractors and suppliers—but needs more.

The best supplying opportunities are with makers of jet engines, the electronics systems for airplanes and in aircraft armament and weapons. In those phases of military aircraft manufacture have come the greatest changes since World War II. Consequently, the former subcontracting tiers cannot be duplicated, and there are more chances for the newcomer.

Breakdown — Aircraft Industries Association of America Inc. points out that $26 billion for aircraft procurement for the U. S. military services and our allies has been appropriated or requested for 1951 and 1952; that's about 40 per cent of all money requested during the period for new military equipment. Half the $26 billion will go to subcontractors and suppliers (see the chart). Some 60 per cent of that half will go to small business, or companies employing less than 500. Of the total sum available to the military for aircraft procurement, only 45.2 per cent of the Air Force share and 47 per cent of the Navy share of the dollar will be contracted to the major airframe producers. The balance is distributed to engine, electronics, weapons and other manufacturers.

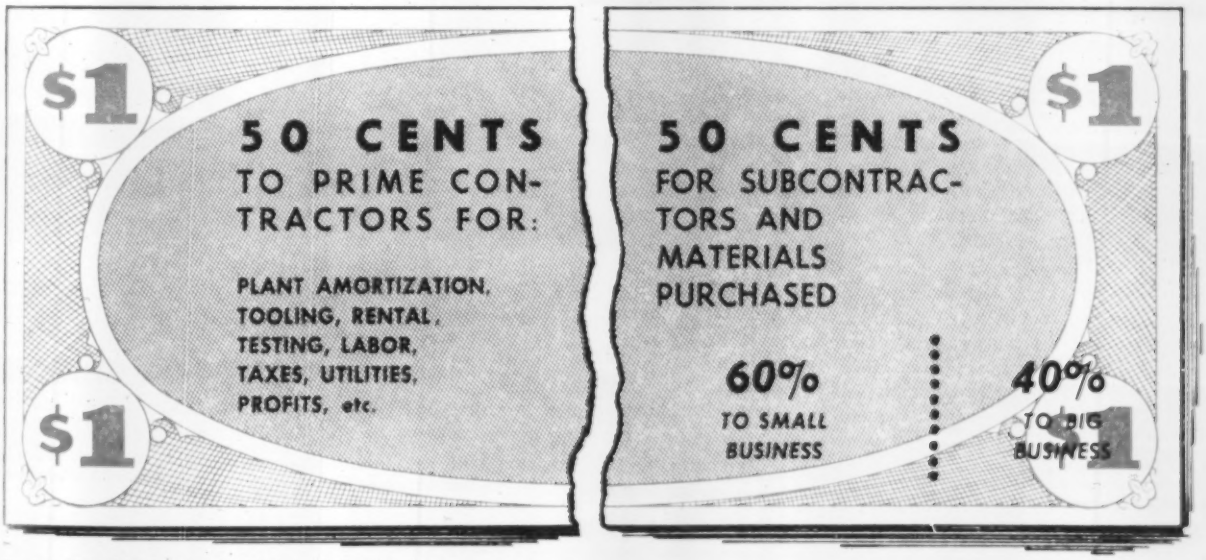
Today's aircraft subcontractor has a tougher job than during World War II. To achieve a tremendous increase in performance, metal sheets must be thicker, materials harder and tolerances closer. Many parts that were once bent into shape must now be machined into shape. The performance improvement has meant more complicated structures and joints and more difficult riveting methods. More and better assembly tooling is required.

To Meet the Test—If you as a potential subcontractor can meet rigid specifications, you may be able to book business in making parts for the extremely complex and intricate radar installations, for pressurization and air conditioning equipment or for the scores of tiny electrical and hydraulic motors now needed. All that gadgetry is subject to extreme load, pressure and temperature conditions and must be made to work during the shattering vibration that accompanies the simultaneous firing of six 20-millimeter cannons.

If you want subcontracts, a good approach is to contact the prime contractor in writing. The prime manufacturer will need to know: The type of work you can perform; the size and location of your plant or plants, including the amount of floor space for production, the size of bays or other subdivisions, strength of floors and dimensions of outlets; a complete list and description, including makes, sizes, model number and capacities, of all the power machinery and equipment available, plus descriptions of that on order, with expected delivery dates; total employees, including breakdown of production and other employees, principal officials, proportion of skilled to unskilled workers, special skills, wage scales and recruiting resources; bank and credit references; facilities for plant security; transportation and freight handling facilities, technical background; and capacity for additional work. Write, don't visit the prime contractor in your initial contact. A big help in making your presentation is a printed brochure giving the necessary information, as completely but as briefly as possible.

Big Business for Small Business—Of the more than 60,000 companies already doing aircraft subcontracting, 52,200 employ less than 500. By 1952, as the maximum rate of the accelerated plane production is reached, an even greater proportion of small firms will supply the aircraft industry. From a percentage standpoint, the aircraft subcontracting programs are approaching World War II levels, although the volume of subcontracting is comparatively low. That's because the quantities of planes on order are substantially less than during World War II, the deliv-

Where the Aircraft Dollar Goes



Source: Aircraft Industries Association of America Inc.

ery schedules are much longer and projected production rates are only about 10 to 15 per cent of World War II levels.

The emphasis is now concentrated on expanding productive capacities, as distinguished from delivery of end items. The industry is working to build a capacity to produce 4200 planes and 18,000 jet engines a month, but actual deliveries will be far below that, unless we get into an all-out war. The subcontracting program is as large as it is now because today's airplanes are twice as big, twice as heavy and have twice the performance of their World War II counterparts.

AMERICAN STEEL & WIRE DISMANTLES LOCOMOTIVES ITSELF
. . . 2000 tons of quality scrap when the job is done

$26.2 Billion for Defense

Some $21 billion of that sum, obligated through April, is for metalworking products

DEPARTMENT of Defense obligated $26.2 billion for the procurement of major equipment, supplies, military construction and expansion of production facilities in the first ten months of the fiscal year ending June 30, 1951. That sum was obligated in firm contracts and financed portions of accepted letters of intent.

Defense spent $21 billion for aircraft, ships, tanks, weapons, ammunition and other hard goods; $3.3 billion for clothing, subsistence and petroleum products; and $1.9 billion for military construction and facilities expansion.

Division—Of the $26.2 billion, the Army accounts for about $10.6 billion, the Navy $5.8 billion and the Air Force $9.8 billion. Procurement for the Mutual Defense Assistance program accounts for $2.3 billion of the $26.2 billion. As of the end of April, about $29.4 billion was available to the U. S. armed services during the current fiscal year for procurement and construction, of which approximately $13.5 billion was authorized by Congress early in January. In addition, at the end of April, about $4.4 billion had been allocated for procurement under MDAP.

Total Department of Defense obligations for the ten months of the fiscal year through April including procurement and construction funds as well as military pay and allowances, research and development and other activities were about $36.8 billion. The above figures do not include funds in the Fourth Supplemental Appropriation Bill for 1951 which is currently pending in Congress. Of the $6.4 billion in new obligational authority requested by Defense in that bill, about $5.3 billion will be for procurement and construction.

Lockheed To Make 12 Models

Lockheed Aircraft Corp., Burbank, Calif., now has quantity-production orders for 12 different airplane models.

Models include: F-94 jet all-weather fighter; T-33 trainer; TO-2 trainer; P2V-5 Navy bomber; 749 Constellation transport; 1049 Super Constellation, the larger Constellation to be introduced on commercial airlines this fall; C-121C, the Air Force version of the Super Constellation; R70-1, Navy version of the Super Constellation; PO-2W, the Navy's new flying combat information center. The other three models have not yet been announced by Lockheed.

Where's the Steel Strapping?

Why the shortage in steel strapping? Signode Steel Strapping Co., Chicago, a major producer, is producing and shipping nearly twice as much as it did a year ago, but the scarcity is as rough as ever.

Signode says the principal reasons for the lack are these: Steel, copper, aluminum, paper and textile industries—the industries under the greatest pressure to expand—are the greatest users of steel strapping; greater use of materials handling in all industries necessitates more use of strapping so products can be lifted, palletized or conveyorized; and the armed services insist that their goods are shipped with adequate strapping.

Signode says the situation will be partly relieved by its new $1 million expansion program. It believes it can get additional steel from domestic mills and from abroad.

Locomotives for Scrap

American Steel & Wire buys 13 old steam units to help relieve the scrap shortage

THIRTEEN railroad locomotives have reached the end of the line in the yards of American Steel & Wire Co.'s Worcester, Mass., plant where they will be scrapped.

W. F. Munford, vice president-operations of the U. S. Steel subsidiary, says that work is being speeded on dismantling the 13 locomotives which were purchased from the Maine Central Railroad. Ordinarily scrap is bought by the company already prepared, but so desperate is the need for the material that American Steel & Wire is preparing it itself.

Hungry Furnaces—"Eighteen weeks of work will be required before those locomotives will be ready for use as heavy melting scrap," says Mr. Munford. "When the job is done, we will have approximately 2000 tons of quality scrap." But that much material will last only three days.

The dismantling operations pose some special problems. To avoid interference with the Worcester plant's normal transportation system, involving more than 25 miles of private trackage throughout 140 acres of mill property, it was necessary to build a special side track with a spur leading to the area set aside for cutting operations.

Big Job—A crew of burner operators, equipped with acetylene torches, works on four locomotives simultaneously. It requires about a week to strip completely an engine weighing 115 tons, and to cut the steel plate to charge box size. Further time is needed to convert the

freight locomotives and tenders weighing over 200 tons each. Earmarked for the open-hearth furnace are plates, tubes, wheels, fire boxes and miscellaneous steel sections. Cast iron and similar materials are routed to foundries. Copper, brass and bronze parts are returned to the railroad for remelting into replacement fittings for its new fleet of diesels.

The 13 locomotives were towed from Waterville, Me., to Worcester by a diesel locomotive.

Rationed: Old Rails, Axles

Owners who want to sell them have to apply to NPA, which will say who can buy them

RATIONING has hit the supply of used railroad rails and axles from railroad rolling stock.

Demand from rerolling rail mills, the rerolling axle industry and the foundry and forging industries for rails and axles had become so great and the supply so tight that the National Production Authority took action that was effective May 31. The action is contained in NPA Order M-64 issued May 28.

Now no person is permitted to deliver or accept delivery of used rails or used axles of rerolling or scrap grade in an amount exceeding ten tons of each item in any one month except by written authorization from NPA.

Apply Here—Applications for authorizations must be filed with NPA by the owners of materials. The application should state the quantity of used rails or used axles involved, the grade, contemplated party or parties to the transaction and the location of material.

NPA from time to time will allocate the supply of used rails and axles and specifically authorize quantities that may be delivered for particular uses.

The restrictions do not apply to use of used rails for tracks, or use of used axles for repairs of rolling stock.

Rail mills purchased more than 800,000 gross tons of rail of rerolling quality last year. About 75,000 tons of this amount were imported from Europe.

Buyers Too—Others needing more scrap rails are foundries which historically used them in their melts. The defense program has caused not only these foundries to increase their demand for scrap rails but has caused other foundries, which never before used rails, to seek rails to piece out their scrap needs.

Through M-64, NPA seeks to have the original owner of used rails or axles advise it that he has such materials, thereby permitting NPA to distribute the material where it is needed most urgently, and at the same time avoid cross-hauling.

Steel for Power Plants

Steel will be added to copper and aluminum as "program" material during the third quarter of 1951 for expansion and maintenance of electric power utilities, both private and public.

The National Production Authority said an amendment is being prepared to the electric utilities order, M-50, which will establish quotas of steel, as well as copper and aluminum, to be made available for minor electric power requirements during those three months.

YEARLY GET-TOGETHER: Here are the new officers and directors of the Rail Steel Bar Association, at their annual meeting in Chicago. Seated (left to right): Frank C. O'Brien, Burlington Steel Co. Ltd., chairman of board of directors; and Borge Rosing, West Virginia Steel & Mfg. Co., representing director W. G. Summer of the same company who is ill. Standing are O. W. Irwin, president of the association; Howard W. Beatty, Inland Steel Co., treasurer and director; George H. Ackerman, Missouri Rolling Mill Corp, director; and W. H. Jacobs, association secretary

Allies Get U.S. Materials

A new allocation plan will give our allies U.S. copper, zinc, sulphur

U. S. COMPANIES will have to divvy up with other consumers in the free world on rapidly tightening supplies of American raw materials.

Defense Mobilizer Charles E. Wilson says U. S. allies will get priorities ahead of some U. S. consumers for key U. S. supplies when they need them. ECA Administrator William C. Foster says that among the goods that will be affected by the priority and allocation will be copper, zinc, sulphur and cotton.

Turn About?—He states that in return the U. S. expects other countries should show the same consideration for the U. S. in allocating strategic materials which they control. But the U. S. has no plan to enforce co-operation by other countries.

First priority will be given to projects in whatever country they are located that contribute the most toward accomplishing these objectives:

Aid military production of the free world and its expansion or improvement.

Promote "increased supplies" of all materials essential to strengthening the free world, particularly those needed for the U. S. mobilization effort and for mobilization of allies.

Aid countries to reduce their dependence on military and economic assistance from the U. S.

Aid free nations to cut down their dependence on supplies from the Soviet bloc.

Aid in preventing "political deterioration" in key spots in the free world.

No Back-Door Delivery—Mr. Wilson promises that the allocation of key U. S. supplies abroad will be done in a way so as to prevent "shipment or transshipment of war-potential to the Soviets." He says that in some cases U. S. officials "should send directives" to private producers on exporting goods vitally needed overseas by non-Red countries.

When a country such as Britain needs copper, ECA Administrator Foster says that the country will get

it for uses the U. S. thinks essential according to the above set of principles. U. S. consumers will have to divide up what's left.

R. W. Fleming Named to WSB

Robben W. Fleming, director of the Industrial Relations Center at the University of Wisconsin, has been named executive director of the Wage Stabilization Board by Chairman George W. Taylor.

Mr. Fleming will succeed Sylvester Garrett, professor of law at Stanford University who held the post in an acting capacity until his resignation for reasons of health.

Crucible Expands Syracuse Plant

To expand facilities for making and processing steel, Crucible Steel Co. of America is spending $900,000 at its Sanderson-Halcomb Works, Syracuse, N. Y.

An additional electric furnace is being installed in the melt shop. The wire mill is being expanded by auxiliaries to speed and improve cold-finishing operations on coils, small bars and precision-finished wire products. In the bar finishing department, additional installations include a big circular saw, centerless grinding machine for bars, and polishing equipment.

Expanded capacity for cogging will be obtained by additional ingot heating pits. These are auxiliary to cogging mills and to a new 1000-ton press already in operation. There will be expanded facilities for billet and bar annealing. The electric power distribution system of the plant is being improved.

Pittsburgh-Thomas Steel Deal

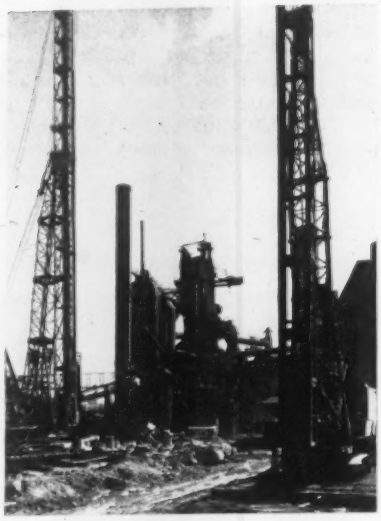
Negotiations have been completed between Thomas Steel Co., Warren, O., and Pittsburgh Steel Co., Pittsburgh, whereby Pittsburgh will acquire all assets and business of Thomas with a stock transfer deal.

Pittsburgh is a basic producer of steel and makes wire and tubular products. Thomas makes cold-rolled carbon and alloy strip steel.

U.S. Loan for Electric Steel Plant

Hazleton Steel & Tubing Corp., Hazleton, Pa., has received a government loan of $7.8 million for construction of an electric furnace steel plant, near Hazleton.

The company will use the steel to manufacture seamless steel tubing and casing for the oil-producing industry. Some of the equipment for the mill was intended for Russia, but has been diverted for the Pennsylvania plant. Pennsylvania Power & Light Co. will provide the electric power for the operation which will be ready to start early next year.



CAISSONS NOT ROLLING: Steel pipe caisson is driven to bedrock to support a 1470-ton-per-day blast furnace being built by Republic Steel Corp. in Cleveland. Twenty-five caissons 30 inches in diameter, 140 feet long and weighing more than 12 tons each are needed for the foundation. Each unit will support 800 tons. In background is Republic's No. 5 blast furnace

Forging Output Up

Commercial shops may produce 1,250,000 tons in 1951, the best since 1943

COMMERCIAL shops will produce an estimated 1,250,000 net tons of drop and upset forgings in 1951, for the highest output since 1943 when about 1.4 million tons were produced. Production in 1950 was slightly less than 1 million tons.

The 120 noncaptive shops in the industry might even exceed the 1943 record if they get all the steel and the manpower they need. They may find the manpower, but a steel bonanza is unlikely. Raymond M. Seabury, secretary of the Drop Forging Association, points out that, on the average, only about 35 or 40 per cent of the industry's volume is now going for defense.

Varied—A few forging shops, notably those in the fast increasing aircraft field are devoting 90 or 95 per cent of their output to defense. Companies like those are operating at or near 100 per cent of capacity, but many others—closer to the industry average in defense work—are down around 75 or 80 per cent of their potential because of steel scarcities.

Most of the defense forgings are going into tanks, prime movers, military automotive equipment, aircraft, artillery, ammunition, shells and shipbuilding. The growing volume of defense work—it may account for about 60 per cent of the industry's total volume by yearend—means that the average forging is getting heavier. Declining the fastest is the demand for lighter forgings used in household appliances. Forging manufacturers say that the need for farm equipment forgings is also tapering off, but the automotive business remains surprisingly steady.

Not as Serious—Labor is a problem, but not as difficult as the steel scarcity. The jobbing industry now has slightly more than 30,000 workers, up 6000 to 9000 in the past six months. A few shops—again specializing in aircraft work—have boosted their employment as much as 250 per cent in the past year.

Nearly all shops now have order backlogs of five months or more. Current delivery promises made by some companies are for the first quarter of 1952. A year ago deliveries of four to six weeks were possible.

Coast Defense Conference Held

Approximately 1000 small businessmen who attended an all-day defense production conference at Woodbury College, Los Angeles, were acquainted with government buying procedures by a team of fifteen representatives of government agencies, procurement offices, education, and industry who spelled out in detail what manufacturers should do to obtain defense contracts.

Headed by Leonard C. Ethredge, assistant to the director, Small Business Division, Munitions Board, the speakers urged manufacturers wishing to do business with the government to: Study the armed forces procurement regulations to learn government buying procedures; describe plant facilities in a simple brochure; select the right buying offices from the index of military procurement offices; sell the contracting officer as fully as a civilian buyer; use initiative in selling the prime contractor to obtain subcontracts.

Other speakers invited manufacturers who have something to supply, to "knock on the door" of procurement offices. The Munitions Board, it was said, has departed from previous methods of telling manufacturers what to produce and is now following a policy of asking them

what they want to make in event of war.

Procurement officers stressed the importance of knowing "who buys what," and mentioned two pamphlets that supply the answer: "Selling To The Navy," and "Purchase Items and Purchase Locations."

Distributed at the meeting was a 60-page brochure, entitled "How to Get Sub-Contracts," prepared by the staff of Woodbury College.

The handy brochure is available from Defense Contract Liaison Agency, Woodbury College, 1027 Wilshire Blvd., Los Angeles 17.

Servel Closes Production Line

Servel Inc.'s refrigerator production line at Evansville, Ind., closed down May 30 because of steel and aluminum shortages. Output will be resumed June 11, but at a 25 per cent reduced rate.

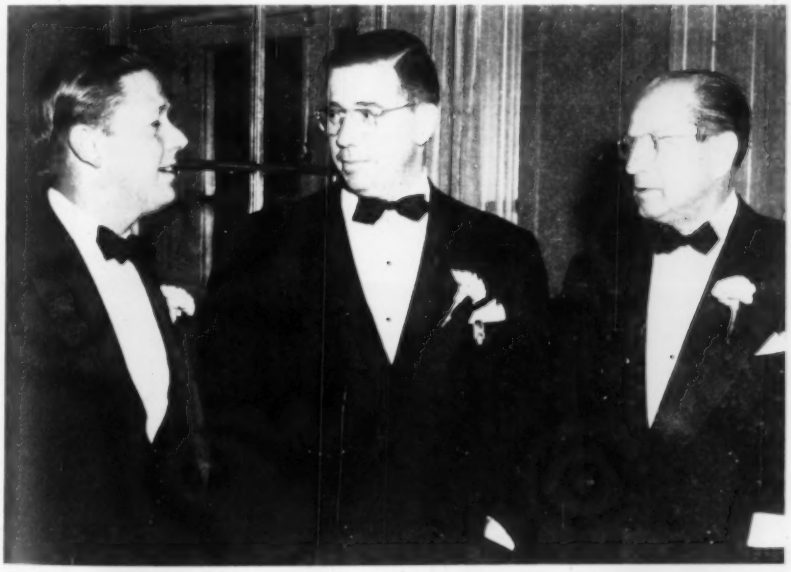
No changes in production of air conditioners, electric refrigeration condensing units and water heaters are planned at present the appliance company says.

Aluminum Window Output Stops

Restrictions on aluminum for civilian production have shut down the manufacturing facilities of Ingersoll aluminum combination windows at the Ingersoll Products Division, Borg-Warner Corp. plant at Kalamazoo, Mich.

The window manufacturing facilities will be moved to the company's Chicago plant at 1000 West 120th St. As soon as aluminum restrictions are removed, production will be resumed at the new location.

HONORED: Eugene G. Grace, chairman of Bethlehem Steel Co., presents the Gary Medal to Edward L. Ryerson, right, chairman of Inland Steel Co. at the 59th general meeting of the American Iron & Steel Institute in New York. Mr. Ryerson won the award for his cultivation of better public understanding of the iron and steel industry and its influence on our national economy



TO AISI DIRECTORATE: Elected to the board of directors of the American Iron & Steel Institute at its 59th general meeting were (left to right): Charles R. Tyson of John A. Roebling's Sons Co., Henry A. Roemer, Jr. of Sharon Steel Corp., and R. K. Clifford of Continental Steel Corp. Max D. Howell of United States Steel Corp. was elected treasurer of the institute, succeeding Harold L. Hughes of U.S. Steel. All other officers were re-elected

Job Pickling Line Installed

American Tool & Supply Co. is installing a semicontinuous steel pickling and processing line in the former Pressed Steel Car Co. plant in McKees Rocks, Pa. Operations are scheduled to begin about June 15.

The pickling line will handle coils up to 48 inches wide, weighing 10,000 pounds, and plates and sheets up to 60 x 144 inches.

Youngstown Welding & Engineering Co. is installing pickling facilities. McKay Machine Co., Youngstown, is providing the processing equipment.

AEC Negotiates with Industry

The Atomic Energy Commission has nearly completed negotiations with four companies for participation in reactor development. No others will be admitted now.

Proposals to build and operate reactors for the production of fissionable materials and power were submitted by: Monsanto Chemical Co., St. Louis, and its associate, Union Electric Co. of Missouri, St. Louis; Detroit Edison Co., Detroit, and Dow Chemical Co., Midland, Mich.; Commonwealth Edison Co. and Public Service Co. of Northern Illinois, Chicago; and Pacific Gas & Electric Co. and Bechtel Corp., San Francisco.

AEC Sponsors Nuclear Course

Companies which have demonstrated their interest in nuclear engineering by enrolling some of their employees as students at the AEC's Oak Ridge School of Reactor Technology for the 1951-52 term are:

Allis-Chalmers Mfg. Co., Milwaukee; J. T. Baker Chemical Co., Phillipsburg, N. J.; Boeing Airplane Co., Seattle; Brown Instruments Division of Minneapolis-Honeywell Regulator Co., Philadelphia; Byron Jackson Co., Vernon, Calif.; California Research and Development Co., San Francisco; Cities Service Research and Development Co., New York; Consolidated Vultee Aircraft Corp., Ft. Worth, Tex.; Douglas Aircraft Co. Inc., El Segundo, Calif.; Foster Wheeler Corp., New York; General Mills Inc., Minneapolis; Hercules Powder Co., Wilmington, Del.

Metropolitan Edison Co., Reading, Pa.; National Lead Co., New York; Newport News Shipbuilding & Dry Dock Co., Newport News, Va.; North American Aviation Co. Inc., Downey, Calif.; Pratt and Whitney Aircraft Division of United Aircraft Corp., East Hartford, Conn.; Public Service Electric and Gas Co., Newark, N. J.; Reynolds Metals Co., Louisville; Sinclair Refining Co., Harvey, Ill.; A. O. Smith Corp., Milwaukee; Socony-Vacuum Oil Co., Paulsboro, N. J.

Small Shops Hardest Hit

Metal shops in San Francisco bay region employing from five to 25 persons are operating at an average of less than 50 per cent capacity and "in many cases face complete shutdowns unless relief is obtained in the form of subcontracting for defense purposes."

The larger metal plants with employment above 25 which are engaged in iron and steel casting, brass, bronze and aluminum work, die casting and machine shop operations are moving along at rates up to 100 per cent.

The findings are those of the San Francisco Chamber of Commerce.

The chamber surveyed more than 3000 shops throughout the San Francisco area, engaged in all types of manufacture in addition to metalworking.

It concluded that the smaller operators are plagued chiefly by these situations: Materials shortages; inability to plan because of uncertainties; difficulty in holding skilled labor for the same reason; and insufficient time or information to prepare bids on defense work.

The chamber quotes the California Metal Trades Association, which has a membership of about 350 of the leading metal shops in the area, as reporting that member shops are running about 90 per cent of capacity primarily on products for civilian consumption.

The association explained that larger, more diversified metal shops are better able to cope with shortages than smaller, specialized shops, since they often are able to concentrate on items requiring less critical materials.

Ford To Make Bomber Parts

Ford Motor Co. will begin making parts for the Pratt & Whitney B-36 bomber at its Automatic Transmission Division plant in Cincinnati by November. Production is scheduled for the division's new manufacturing wing, designed to house manufacture of lubrication pumps, rocker arms and other components, says Marvin L. Katke, general manager.

Dow Takes Over Two Plants

To be utilized for rolling and extruding magnesium for defense purposes is a plant at Madison, Ill., to be operated by Dow Chemical Co., Midland, Mich. Formerly run by Standard Steel Spring Co., the plant will include a continuous rolling mill for magnesium.

Dow has also received a letter of intent from the government for the reopening of the government magnesium producing facilities at Velasco, Tex. Production will begin in early spring.

Claims Amendment Frees Loans

An amendment to the Assignment of Claims Act, signed by President Truman, should help small concerns get a larger share of defense business. Its effect will be to break a serious log-jam of pending loans to small firms on defense orders involving several million dollars.

The new law specifically relieves banks and other lending institutions from responsibility for tax deficiencies and renegotiations charged against a defense contractor to whom it loans money. The jam was caused when the comptroller general ruled recently that lenders were virtually co-signers with the contractor in loans financing defense work.

Procurement Guide Available

A pocket-size guide to every principal military installation and procurement office in the 13 western states is being distributed to businessmen, contractors and suppliers by Western Air Lines, Los Angeles.

Containing a clear, symbolized map of all important armed forces business centers and defense facilities in the West, the airline's guide is titled "Fastest Route to Western Defense Contracts."

STEEL's Weekly Summary of Subcontract Opportunities

FIRESTONE Tire & Rubber Co. becomes a large potential source of subcontracts for the metalworking industry upon receipt of a $62 million contract to make the Navy's new three-inch anti-aircraft gun.

The weapon was developed by Naval Ordnance and is designed to replace the four-gun, 40-millimeter mount now in use. Weighing 34,000 pounds, the twin-gun unit is fired by radar control and is automatically loaded. Firestone reports a large number of the machined parts will be subcontracted.

Reports from Lockheed Aircraft Corp. suggest that company's long list of subcontractors may be increased as a result of the recent Air Force order for production of a new-type fighter-bomber version of the Lockheed F-94D. Another major aircraft supplier, Texas Engineering & Mfg. Corp., Dallas, reveals it may have sub-subcontractor possibilities in a multi-million dollar commitment to make components for Douglas' A2D Skyshark. The company is now supplying five large airframe manufacturers and has a backlog of $80 million.

Prime contracts, of interest to the metalworking industry, follow in STEEL's weekly summary:

PRODUCT	CONTRACTOR
Gravity Conveyors	Wilkie Co., Philadelphia
	Logan Co., Louisville
Hydraulic Jacks	Hein-Werner Corp., Waukesha, Wis.
	Weaver Mfg. Co., Springfield, Ill.
Screw Jacks	Joyce-Cridland Co., Dayton, O.
Electric Winches	Jaeger Machine Co., Columbus, O.
Cranes (truck-mounted)	Michigan Power Shovel Co., Benton Harbor, Mich.
Bomb Lift Trailers	Globe Hoist Co., Philadelphia
Bomb Dolly Assemblies	Waco Aircraft Co., Troy, O.
	The Belt Corp., Orient, O.
Cylinder Compression Gages	Century Tool Co., Philadelphia
	Ramsey Machine & Tool Co., Hillside, N. J.
Pump Assemblies	Aircraft Products Co., Clifton Heights, Pa.
	Pesco Products Div., Borg-Warner Corp., Bedford, O.
Tractors	Whiting Corp., Harvey, Ill.
Trailers	Fruehauf Trailer Co., Detroit
	Trailmobile Co., Cincinnati
Semi-trailers	Kentucky Mfg. Co., Louisville
	Jahn Trailer Co., Chicago
Rooters	Arrow Mfg. Co., Denver
Portable Sawmills (diesel powered)	American Sawmill Machinery Co., Hackettstown, N. J.
Fuel Servicing Semi-trailers	Heil Co., Milwaukee
Starter Units for Hydraulic Presses	A. B. Farquhar Co., York, Pa.
Slitter & Rewinder Machines	Cameron Machine Co., Brooklyn, N. Y.
Trimming Presses	E. W. Bliss Co., Canton, O.
Grinders	Gallmeyer & Livingston Co., Grand Rapids, Mich.
Hydraulic Power Units	Vickers Inc., Detroit
Rocket Heads	Tecumseh Products Co., Tecumseh, Mich.
Economizer Elements	Combustion Engineering Superheater Inc., New York
Exhaust Valves	Harold Benedict Co., Detroit
Turbochargers	Gustafson Mfg. Co., Corpus Christi, Tex.
Cam Assemblies	Teletype Corp., Chicago
Radio Sets	Western Electric Co. Inc., New York
	Utility Electronics Corp., E. Newark, N. J.
Automatic Electric Telephone Systems	Automatic Electric Sales Corp., Chicago
Radio Receivers	Stamford Electronics Co., Stamford, Conn.
Sonar Transducers	Massa Laboratories Inc., Hingham, Mass.
Motors	L. N. Schwien Engineering Co., Los Angeles
	Pesco Products Co. Div., Borg-Warner Corp., Cleveland
Gyro Motors	Russell Electric Co., Chicago
Generator Assemblies	Beech Aircraft Corp., Wichita, Kans.
	United Mfg. Co. Div., United Advertising Corp., New Haven, Conn.
	Homelite Corp., Port Chester, N. Y.
Transmitters	U. S. Gauge Div., American Machine & Metals Corp., Sellersville, Pa.
	Cardell Manufacturers, Dayton, O.
Testing Sets	Westinghouse Electric Corp., Pittsburgh
Regulators	

CHECKLIST ON CONTROLS

GOVERNMENT control orders are digested or listed each week in this "Checklist on Controls." For complete copies of NPA orders, write to U. S. Commerce Department, Division of Printing Services, attention E. E. Vivian, Room 6225, Commerce Bldg., Washington 25. For ESA orders, write J. L. Miller, Economic Stabilization Agency, Room H367, Temporary E Bldg., Washington 25.

Materials Orders

LEAD—Amendment of May 28, 1951, of NPA Order M-38 requires dealers to set aside for defense orders 25 per cent, rather than the previous 20 per cent, of the lead available to them per month. The amendment also provides that beginning June 1, 1951, for July shipment, primary refiners will be required to set aside 5 per cent of their anticipated monthly production of pig lead to care for "hardship" cases. "Lead scrap" and "lead products" are redefined by the amendment. Use of lead is restricted now to not more than 100 per cent of the average monthly use by weight during the first six months of 1950; persons using less than five net tons of lead a month are exempted.

USED RAILS, AXLES—NPA Order M-64 issued May 28, 1951, and effective that date, says that after May 31, 1951, no person shall deliver or accept delivery of used rails or used axles of rerolling or scrap grade in an amount exceeding 10 tons of each item in any one month except by written authorization from NPA. Applications for authorizations must be filed with NPA by the owners of materials. The applications should state the quantity of used rails or used axles involved, the grade, contemplated party or parties to the transaction and location of the material. NPA from time to time will allocate the supply of used rails and axles and specifically authorize quantities and uses for deliveries.

IRON & STEEL SCRAP—Amendment of May 28, 1951, of NPA Order M-20 was made to provide a cross-reference to the used rails and used axles order, M-64. M-20 established inventory limitations for iron and steel scrap and subjects such scrap to allocation.

ZINC—Amendment of May 28, 1951, of NPA Order M-9 requires manufacturers of special high grade slab zinc to set aside 20 per cent of their anticipated monthly production of it, rather than only 10 per cent, for filling of defense-rated orders. Required acceptance of defense-rated orders for all other grades of slab zinc, zinc dust and zinc oxide remains at 10 per cent. Beginning June 1, 1951, producers and importers of slab zinc must set aside 5 per cent of their anticipated monthly production and imports as an emergency reserve.

USE OF ZINC—Amendment of May 28, 1951, of NPA Order M-15 was made to control the use of slab zinc and zinc alloys only. Limitations on the use of other zinc products have been deleted from the revised regulation. Civilian consumption of special high grade slab zinc, beginning July 1, 1951, will be limited to 70 per cent of the average quarterly use during the first six months of 1950. Consumption of zinc alloys is restricted to 80 per cent of a user's average quarterly consumption by weight during the base period. Permitted inventories of zinc are reduced from a 45-day to a 30-day supply.

NPA Delegations

MINING MACHINERY—Amendment of May 22, 1951, of NPA Delegation 5 removes references to mining machinery. The basic delegation gave the department of the interior claimant responsibilities for production facilities for minerals and metals, and allocation and priority controls for manufacture and distribution of mining machinery. The allocation and priority controls were returned to NPA May 10, 1951, under terms of an interagency agreement. The May 22 amendment formalizes the pact.

EXPORTS—NPA Delegation 12 issued May 23, 1951, and effective that date authorizes the Office of International Trade to assign defense order (DO) ratings for procurement of controlled materials by licensed exporters for export. Ratings for shipments of licensed controlled materials exports to Economic Cooperation Administration countries are to be identified by DO-36 and those to all other countries by DO-37.

BEARINGS—Amendment of May 23, 1951, of Supplement 1 to NPA Delegation 1 authorizes the secretary of defense to arrange for rescheduling of deliveries of instrument bearings for military aircraft production. This amendment, effective May 23, 1951, permits bearings scheduled for delivery to one manufacturer to be shipped, when necessary, to another manufacturer to avoid delays in military aircraft production.

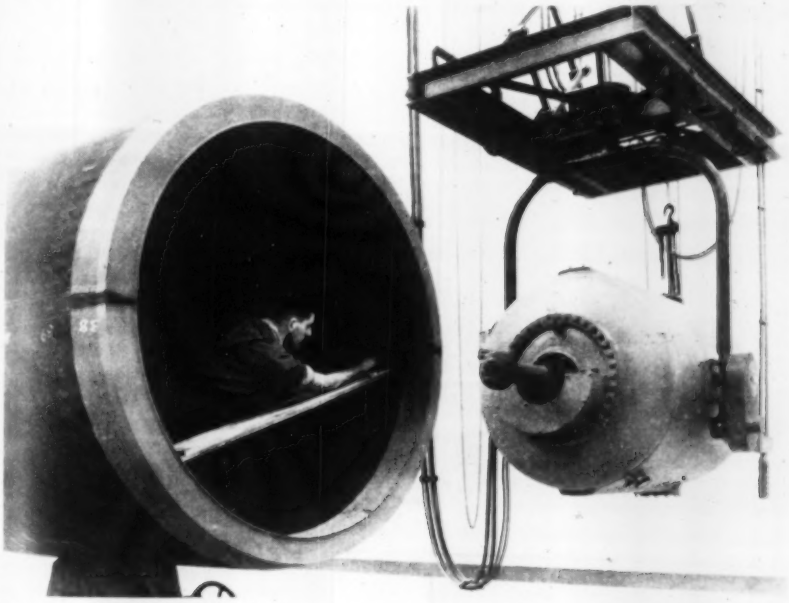
Price Regulations

NICKEL—The Office of Price Administration issued on May 24, 1951, a correction to Ceiling Price Regulation 29 (nickel-bearing scrap). The correction concerns preparation premiums.

PRICE PROCEDURES—Revision of May 26, 1951, of Price Procedural Regulation 1 is designed to reflect basic organizational changes and related delegations of authority or assignments of authority within the Office of Price Stabilization.

DPA Order

ESTIMATING REQUIREMENTS — Defense Production Administration Order 1 issued May 24, 1951, and effective that date, designates 19 government agencies responsible to the DPA for estimating basic material requirements of the various segments of the economy during the present emergency. These claimant agencies have the primary responsibility of drawing up the estimated requirements of the segments of the economy under their jurisdiction. These requirements then will be submitted to DPA's Office of Program Requirements and will be matched against estimates of the total supply of materials that will be available for use, as the initial step in determining the general allotments under Controlled Materials Plan.



EYE FOR ERRORS: Stimulus of military specifications and need for control over quality is giving a big boost to use of x-ray inspection equipment. Here is a 2-million volt x-ray unit used for radiographic inspection of welds in pressure vessels. The huge device was built by General Electric X-Ray Corp. for use by Babcock & Wilcox, Ltd. in its Renfrew, Scotland, plant

Windows of Washington

By E. C. KREUTZBERG Washington Editor

If the steel supply is to balance with demand more quickly than generally expected, administration officials want to know why more of it hasn't begun to be available

THERE'S not enough steel for the steel expansion wanted by defense production officials.

That's the charge by steel men in the latest industry-government controversy. Industry representatives say we should have a capacity, as of July 1, 1953, of 118 million net tons of steel ingots and 82.3 million tons of pig iron. Government men hold that the capacity needed by then is 130 million tons of ingots and 95.3 million tons of pig iron. The pig iron target in both cases is intended to meet not only the requirements of the steel industry but also those of the steel, gray iron and malleable casting industries.

Pooh-Pooh — Steel representatives discount the government figures. They say the big increase in steel set-aside percentages for defense requirements makes impractical any quick attainment of the capacity government men want. The products most urgently needed in iron and steel expansion—plates and structural shapes—already are under such heavy defense pressure as to leave only about 25 per cent of the output of those products in the free market for the third quarter.

Steel men also argue that an expansion in ingot capacity involves far more than merely building more open hearths. They question whether corollary facilities would be available to make possible a production rate of 130 million tons a year by 1953. They particularly doubt whether iron ore production, coal washing facilities and lake and ocean ore fleets would be adequate.

The Debate Continues — Despite those arguments, administration officials are still arguing for more expansion. They hopped on statements made at the American Iron & Steel Institute meeting (STEEL, May 28, p. 49) to the effect that steel supply would balance with demand at an earlier date than expected. If that's true, they say, more steel for more iron and steel expansion should begin to be available.

One steel man predicts: "This whole issue is going to get red hot in the next few months."

Locomotive Steam-Up . . .

Next item on the agenda of the House Judiciary Committee's Monopoly Subcommittee is a "thoroughgoing investigation" of the administration of the Defense Production Act—particularly the services of industry men, working for the government without compensation while on leave from their employers. Chairman Emanuel Celler (Dem., N. Y.) decided on such a course after a preliminary investigation of charges that General Motors Corp. had been favored over four other locomotive builders—Baldwin-Lima-Hamilton, American Locomotive, Fairbanks Morse, and General Electric—in authorizing steel priorities.

The House subcommittee expects to start hearings June 11 on the broader investigation.

NEW DIRECTOR: Richard F. Sentner (above) U. S. Steel Co., Pittsburgh, replaces Melvin W. Cole as director of the Iron & Steel Division of NPA. Mr. Cole returned to his duties with Bethlehem Steel Co. at Detroit

So the Twain Shall Meet . . .

The big price spread between East and West Coast shipbuilders is keeping the Maritime Administration from placing orders for 16 or 17 more high-speed cargo ships of the "Mariner" type. The 25 Mariners recently placed with eastern yards were let at prices ranging from $7.75 million to $8.53 million each. Prices quoted by the West Coast yards range from $9.51 to $10.43 million each. For tactical reasons the government wants some of these ships constructed on the West Coast and is hammering away to get prices there more in line with those of eastern yards.

'Mock-Up' Ship Beached . . .

The Navy wants a mock-up ship at its Naval Supply Center at Cheatham Annex, Williamsburg, Va., but it hasn't more than $199,800 to pay for the craft.

The dry-land ship would be used to train cargo handling battalions; it would be fitted out with winches and booms to permit actual handling of cargo in loading and unloading. When bids were opened, all were in excess of the money authorized for the project. Now Rear Adm. W. O. Hiltabidle, public works officer of the Fifth Naval District, Norfolk, Va., and the man in whose hands the project is, is waiting for new bids.

Problems Around the House . . .

Six research projects under contract by the Housing & Home Finance Agency should elicit more than just passing interest from the metalworking industry.

National Bureau of Standards is investigating: Relative strengths and rigidity of welded steel tube columns of different sizes and kinds in contrast to properties of columns made of standard black steel pipe; physical properties and performance characteristics of flashing materials—such as corrosion resistance, ease of handling and forming, etc.; possibilities for improving conventional household plumbing systems; possibilities for developing smaller, simpler, and more efficient heating systems for small homes. Southwest Research Institute, San Antonio, Tex., is studying floor slab designs that will resist deformation from the effects of "active" soils.

University of Illinois, Urbana, Ill., is seeking to evolve less complicated and more economical residential plumbing systems than those conventionally in use. Details of the work may be obtained from the HHFA's Division of Housing Research, Washington 25.

Material Shortages Hit Sterling Nations

The Iranian oil situation points up one dramatic scarcity, but supplies of other raw materials are nearly as tight for empire and sterling bloc countries

RAW MATERIALS availability is bothering British Empire and Sterling bloc nations as it never has before. The Iranian oil crisis points up one dramatic material shortage, but nearly as serious are scarcities of metals and solid fuels.

In Britain itself, metalworking men could use more of practically everything but coal. Particularly tight are scrap and semifinished steel. Much of the latter is normally imported from the European continent.

South Africa has the raw materials it is one of the richest mining areas in the world for many minerals—but the problem is to get them extracted and shipped.

A major problem in India is lack of metallurgical grade coal. The government is now investigating the possibility of smelting iron ore without coking coal.

Coke is also the headache of migraine proportions in Australia. Its scarcity may stunt the growth of the dominion's infant steel industry.

Welsh Mills Close for Scrap Lack

Three steelworks in South Wales will soon close down because of no scrap. The facilities are old and would have been retired anyway when the new Abbey plant of Steel Co. of Wales is fully operating. The materials shortage hastened the retirement.

Imports of semifinished steel continue to decline despite the urgent necessity of improving supplies for the rerolling industry. In March only about 9000 tons of steel semifinished came into the country, just half the March, 1950, total. To make up for the lack of semifinished, British steelmen have had to resort to pig iron imports. Scrap imports have also declined. In March they totaled only 58,000 tons, compared with 272,000 tons in March, 1950.

Machine tool builders are operating at full tilt, but they have had to reduce shipments 35 per cent to buyers not in direct defense work. The U. K. railroad equipment business is booming. It's largest order, placed with British Iron & Steel Corp. Ltd., is for railroad sleepers worth more than $2.8 million. The equipment is destined for Australian lines.

Oil Project Started in Africa

Construction of the world's first modern, commercial, gasoline-from-coal synthesis plant will start in South Africa soon. The facility is being built for South African Coal, Oil & Gas Corp. Ltd., a government-backed firm. It will be on the Vaal river about 40 miles south of Johannesburg.

The project is an integrated plant which embraces the opening of virgin coal deposits to supply raw material; the construction of above-ground gasification facilities; and the complete synthesis plant to produce liquid hydrocarbons from M. W. Kellogg Co.'s processes. Kellogg's home office is in New York.

An estimated 15 million tons of copper ore await excavation from the Mountains of the Moon in western Uganda, central Africa. The Uganda government, under British rule, plans to build a railroad 200 miles from the capital, Kampala, to the deposits in some of the roughest country in the world. Copper shipments won't start until the middle of 1954.

India Works To Conserve Coke

India will spend $100,000 on a pilot plant to smelt iron ore without coke. The project is being undertaken by the government's research organization in collaboration with Tata Iron & Steel Co. Ltd., Jamshedpur. If successful, the development would facilitate the establishment of the iron and steel industry in parts of India where high-grade iron ore, but no coking coal, is available.

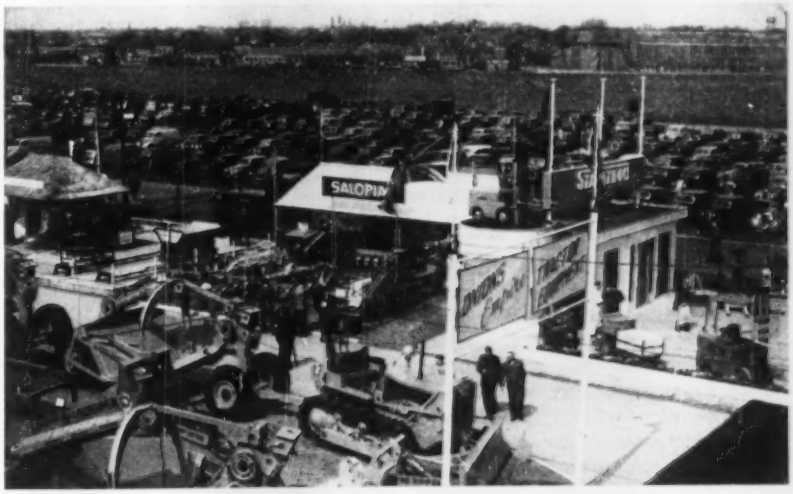
The Indian government has under consideration two separate schemes to erect steel plants with a capacity of 400,000 to 500,000 tons each. Those plants would be established in co-operation with foreign steel producers. India now needs a capacity of about 1 million more tons of steel a year. The projects are not likely to be implemented for a while because of financing.

The three steel companies in India will go ahead with $70 million expansion plans. The government will lend $24 million to Tata Iron & Steel, $1 million to Steel Corp. of Bengal and $5 million to Mysore Iron & Steel Co. Ltd. Tata hopes to raise its yearly finished steel capacity from 750,000 to 935,000 tons. Steel Corp. plans a finished steel capacity of 850,000 tons annually by the time its program is finished. Mysore's capacity boost would be about 75,000 tons, to 100,000 tons. The total of India's steel potential would be increased by 450,000 tons.

Coal: Dark Spot for Australia

Australia's steel output is declining, partly because of coal shortages. Steel ingot production in New South Wales in the first two months of 1950 was 229,200 tons, compared with 191,100 tons the same period this year.

That has played hob with the dominion's growing metalworking industry. To relieve the situation, Australia may turn increasingly to electric steel. Some $16 million worth of electrical generating apparatus has been ordered from Westinghouse Electric International Co. The equipment, comprising 21 unit power plants, will generate and distribute 110,000 kw of power in New South Wales, Victoria and Queensland. Added power capacity will make more feasible electric furnace steel.



LONG ON FINISHING CAPACITY, SHORT ON MATERIALS
. . . British Industries Fair emphasizes the nation's scarcities

New Employment Peaks

Labor Department official predicts we'll meet the higher employment needs in 1952 or 1953

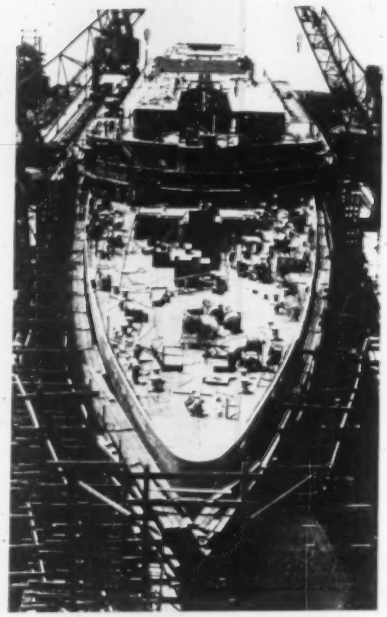
DEMAND for defense manpower will rise sharply in late 1952 or early 1953. Total manpower needs may continue to expand in 1953 as a result of increases in capacity.

So says Louis Levine, chief of Division of Reports & Analysis of the Labor Department's Bureau of Employment Security. He points out that thus far there has been very little unemployment as the result of cutbacks in the use of materials or conversion to defense work. But he thinks some conversion unemployment—of short duration—is inevitable. It has not yet occurred to any serious extent because industrial conversion has been gradual thus far.

Working Out—Mr. Levine thinks we have been "fortunate" in our manpower situation to date. Shortages there are in skilled categories, but nothing like those the Labor Department once feared. We have already weathered the worst of the draft. The Armed Forces had 1.4 million personnel last June. They now have nearly 3.5 million, and the desired level will be achieved within the next few months, before peak defense production will be a serious drain on the labor pool. After midyear, "military services will need only replacements."

Broad Labor Department estimates indicate an increase in total manpower needs for defense (services and industry) of 4.9 million between the fourth quarter of 1950 and the fourth quarter of 1951 and an additional expansion of 2.3 million during 1952. "Those demands can be met without undue strain upon the economy," says Mr. Levine, although there will be specific industries and occupations where manpower is unusually short. The needs for 7.2 million more can be met by the transfer to defense work of 3.4 million workers; lowering of unemployment by 600,000; and by enlarging the labor force by 3.2 million. That latter expansion will be helped through normal growth of 1.8 million by the end of 1952.

More Influence—Thus far this year, the volume of defense employment, though rising sharply, has had less influence on the labor market than the steady continuance of high-level civilian demand. But several segments of manufacturing have already felt the impact of the defense program. Manufacturing employment was near 16 million in April when there were nearly 2 million more manufacturing workers employed than at the beginning of the upswing in March, 1950. Nearly all of the rise over the year occurred in durable goods which was up by 1.5 million workers.



LIGHT HEAVYWEIGHT: When it is launched this month the S.S. United States, superliner being built for the United States Lines, will gross about 50,000 tons. Over 2000 tons of aluminum were used in its construction—a good deal of it for exterior installations where strength and high corrosion resistance are required

Increases in metalworking industries have been particularly pronounced in aircraft plants, shipyards and machinery companies. Aircraft employment increased by 100,000 in the first 6 months after the Korean War began. Employment in 81 aircraft establishments accounting for 90 per cent of all companies in that industry has increased 25 per cent since September, 1950. Another 20 per cent hike may be realized by next July. Shipyard employment is now about 209,000, a 40 per cent gain over the past year. The yards may hire 200,000 more. Employment in machinery plants rose 36 per cent from January, 1950, to January, 1951, and a further gain of 10 per cent is expected by July. Machine tool employment has increased the most—44 per cent from January to January—in the machinery industry.

Labor Force of 90 Million?

Nearly 90 million men and women will be in the U. S. labor force in 1975, says Labor Department economist Harold Wool. The projected 1975 labor force would be about 25 million higher than the actual 1950 figure—indicating an average rate of growth of about 1 million per year.

The projections are based on an assumption of a peacetime full employment economy without any intervening large-scale hostilities. Also assumed are relatively high birth rates during the 1950s and an extension of past trends in the degree of work participation among men and women of different age groups.

The rate of labor force growth will fluctuate considerably over the next 25 years, says Mr. Wool. The inflow into the labor force will be relatively low until the end of the current decade, but will then rise sharply during the 1960s as the peak baby crop born during or shortly after World War II reaches working age. A moderate decline in growth is expected after the late 1960s.

Shipyard Workers Needed

American shipyards, naval and private which already face shortages in certain skilled artisans, are expected to add 200,000 workers to their payrolls in the next 16 months, says William C. McCamant, head of the manpower branch of the Navy's Bureau of Ships.

The yards will double employment but the total will not be comparable with the peak of 1,722,000 shipyard workers in December, 1943.

Shipyard positions most difficult to fill include inside machinists, electronics mechanics, engineers and sheet metal workers.

Coast Aircraft Employment Up

West Coast aircraft manufacturers currently employ 165,792 workers says Aircraft Industries Association. Some 130,000 were employed there at the beginning of Korean hostilities. AIA predicts employment will rise to 191,000 in six months.

Bulk of the work force, 136,935 is in southern California. The five major airframe manufacturers in that area are Douglas with 29,908, North American with 21,009, Lockheed with 19,600, Consolidated Vultee with 18,750 and Northrop with 10,082.

The 11 companies in southern California use 22,796 subcontractors and suppliers.

Steel Lack Closes Toledo Plant

Champion Spark Plug Co. closed its Toledo, O., plant May 28 for at least a week because an expected supply of steel was not delivered in May.

The closedown laid off about 2500 employees, members of UAW-CIO who are seeking a 6-cent-an-hour

wage raise, a 4-cent-an-hour annual improvement factor increase and a cost-of-living escalator clause.

Power Production: 'Sufficient'

Electrical manufacturers in 1951 will equal or exceed last year's record production of power and associated equipment, says Walter Evans, vice president of Westinghouse Electric Corp. He reports this output will be sufficient to sustain U. S. civilian needs as well as make an estimated 35 per cent of production available for defense commitments.

Utilities Burn More Coal

America's electric utilities, which consumed nearly 92 million tons of coal in 1950, probably will consume a record 108 million tons this year, about the same as the steel industry which is the leading consumer.

So said L. R. Ludwig, assistant to the vice president in charge of industrial products, Westinghouse Electric Corp. when he addressed some 500 delegates to the American Mining Congress who attended the coal show in Cleveland.

"The total annual sales of kilowatt-hours by the electric utility industry will rise from about 275 billion in 1950 to 634 billion in the next 15 years," says Mr. Ludwig. That means that by the mid-1950s, electric utilities will be using about 211 million tons of coal annually.

Slag Output Sets Record in 1950

A record output of 24,926,033 net tons valued at $29,480,858 was established by the blast furnace slag industry in 1950. Statistics are based on a canvass by National Slag Association of the 42 companies operating 63 plants for processing air-cooled slag and 12 companies operating 17 plants for expanding slag. Results of the canvass were assembled in cooperation with the Interior Department's Bureau of Mines.

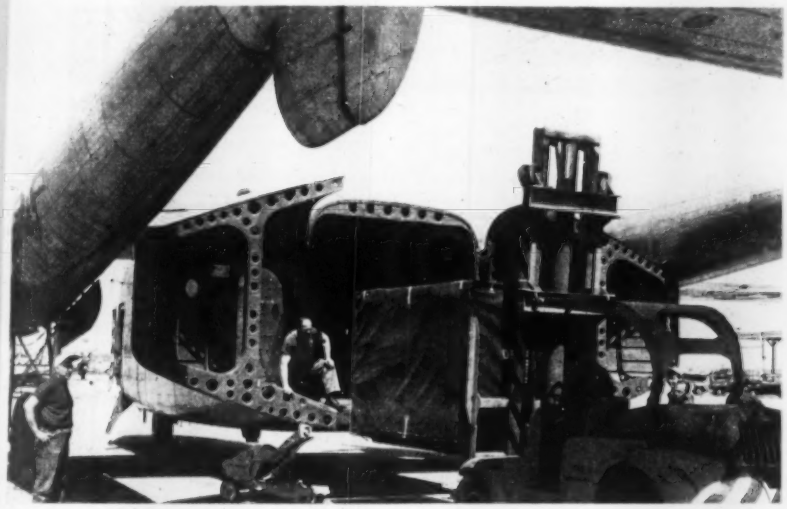
Screened air-cooled slag, the major production, reached a new total of 20,047,844 tons, an increase of 13 per cent over the 1949 figures. The recovery of iron by processors during 1950 amounted to 296,603 tons, an increase of 44 per cent over 1949.

50 Candles For Dixisteel

Celebrating completion of a half-century in the steel business this year is Atlantic Steel Co., Atlanta. When founded in 1901 as Atlanta Steel Hoop Co., it manufactured only cotton ties and barrel hoops from steel purchased in Pittsburgh. Today the company operates three open-hearth furnaces, blooming and billet mills, two hoop mills, and wire, rod and nail mills. It manufacturers 65 different products in thousands of shapes and sizes. A 60-ton electric furnace is now under construction.

The company was making its own steel by 1906 and last year broke all previous records by turning out more than 200,000 tons. A current expansion program is expected to increase production 50 per cent and double output of rolled products.

Commemorating the anniversary, the company has published a 178-page illustrated cloth-bound book reviewing its first 50 years. "The Story of Dixisteel," written by board chairman Charles F. Stone, informally reviews operations of the company and the men who guided it through the stormy first half of the 20th century.



HYSTER LOADS PACKAGED PRINTING PRESS INTO C-82
. . . machinery without roots gets there faster

Hot Off the Press

Offshoot of the Air Force program to increase mobility of heavy equipment: A packaged printing press that can be flown to advanced airstrips and within two hours after unloading turn out multi-color reproductions of aerial charts, reconnaissance photographs and psychological warfare material.

The 10,000-pound offset press, developed in four months by Harris-Seybold Co., Cleveland, contains all tools and supplies in one neat package.

An ingenious portable press room doubles as the shipping container. Standard Air Force cargo planes, ground vehicles and materials handling equipment can be used to transport the press.

STRIPPING PRESS FOR ACTION
. . . cabinet doubles as press room

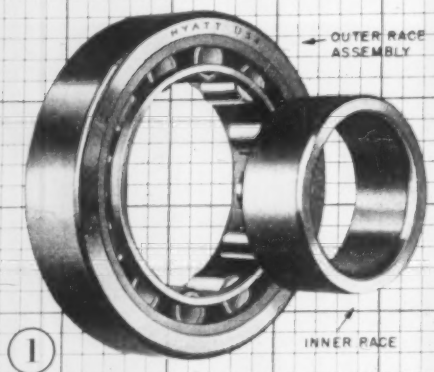
Westinghouse Saves Scrap

A scrap conservation program at Westinghouse Electric Corp.'s Appliance Division plant in Mansfield, O., has added to appliance production and produced a savings estimated at $1.5 million a year, says J. H. Ashbaugh, vice president.

Copper, aluminum, brass, nickel and steel are being culled from the division's appliance producing lines daily. Some of the material is reprocessed for further use; stamping methods are changed to stretch scarce steel; plating processes are improved to stretch copper and nickel supplies.

Back of the ability to produce dollar savings and the ability to stretch materials is the division's salvage department, opened in 1935.

Some things you should know about HYATT HY-LOADS



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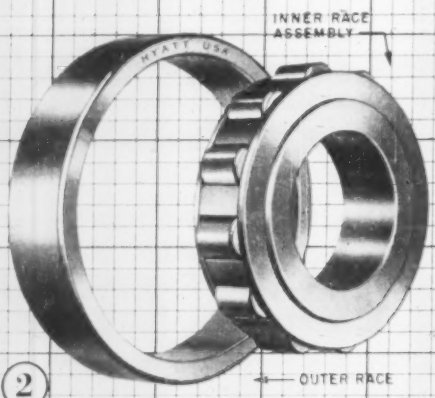

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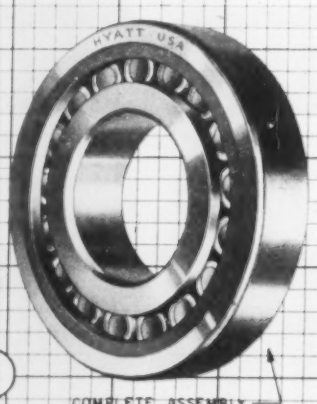

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From a machine design standpoint, the Hyatt Hy-Load line of bearings is most versatile, as you may see. Three series in a wide range of sizes and types for various application needs.

1 If design requirements are such that a larger shaft diameter is desirable to produce greater rigidity without disturbing boundary dimensions, a separable inner race type Hyatt Hy-Load bearing can be used with the inner race omitted. The rollers then operate directly on a suitably hardened and ground shaft.

2 When the housing bore must be kept to a minimum, a separable outer race bearing can be used with the outer race omitted. The rollers then operate directly in a housing bore of suitable hardness and finish.

3 If the design requires that the bearing be installed as a unit, Hyatt also provides non-separable types of Hy-Load bearings.

All these desirable design and assembly advantages for the machine manufacturer are passed on to the user, who in turn gets all the advantages of better built, longer-lived, trouble-free equipment. Hyatt Bearings Division, General Motors Corp., Harrison, N. J.

HYATT ROLLER BEARINGS

By H. C. TUTTLE *Detroit Editor*

Mirrors of Motordom

The postwar car has already been achieved, most automotive men agree. The 1952 models, with their new stylings and engines, will be post-postwar designs

MORE ADVANCES in automobile styling and engineering have been made in the six years since the end of World War II than in any similar period in automotive history. So says Ivan L. Wiles, General Motors vice president and Buick Division general manager.

There may be some question raised as to the merits of the individual high-points of the period which Mr. Wiles cites, since all are Buick-pioneered, but the generalization can go unchallenged. The top innovations of the era, he claims, are the torque converter transmission and the "hard-top" coupe. The Buick combination bumper-grille and "easy-eye" glare-reducing glass are also labeled by Wiles as important developments. Other advances of a more general character include picture-window visibility and higher compression engines.

Here Already—Competing GM divisions and other car makers can list a number of equally significant innovations but few would quarrel with this statement . . . "When you add up all these important new styling and engineering advances it is obvious that the 'postwar car' which everyone has been talking about actually is with us today."

If today's models are the ultimate in the postwar period, what era will the 1952 cars characterize? That seems to be a fair question since, according to all indications, the new models will be as different in many respects as those which ushered in the postwar period. Probably the most significant engineering change will be in engine design. Overhead valving and higher compression is certain in at least six-cylinder models. Eight-cylinder design will swing in greater measure to V-shape with overhead valves for more makers. Where V-8s now characterize the car, further step-up in horsepower through combustion chamber change is regarded as certain. Two new V-8 engines, thought likely to be introduced this fall, probably will not appear for another year because of machine tool troubles. Styling will differ radically with nearly all makers. One thing is certain. Cars will be much glassier, with the present "hard-top" coupe's lines dominating all body styles. A tendency in the new styling will be to accomplish by new lines the streamlining effects which have been sought through lavish use of chrome trim.

Influencing Factors—Next year's models are being influenced by two important considerations: sales appeal and materials supply. A limit on the number of body styles has already been self-imposed by GM divisions. NPA's compromise with the automakers to encourage them to channel the same amount of material into a great number of units is bound to make itself evident. That probably will not be seen at first in additional new cars of the Rambler-Henry J type, but rather in greater emphasis on less fancy conventional-size cars.

Such developments are particularly imperative because of the cost-price squeeze under OPS regulations which will hurt makers more as production is curtailed further this summer and fall.

READY TO STEAM UP: Diemakers at Buick make a final check of the calibrations on 3-ton dies before they are placed in a 10-ton steam hammer that will stamp out the housing shown in the picture. The dies will be used to forge tank transmission housings at Buick's Flint, Mich., plant. Buick has a contract to produce tank transmissions of the torque converter type

Transmissions Change, Too

The postwar period's evolutionary change has not run its course in the field of automatic transmission design and acceptance. The price factor and limited availability of materials for these transmissions will operate against any short-term trend or desire for equipping all cars with shiftless driving, but a review of the speed with which these devices have caught on implies that the trend is compelling and will not long be downed by temporary factors.

One-third of the cars built last year were equipped with full or semiautomatic transmissions. *Ward's Automotive Reports* tabulated production of these devices last year at 2,211,918 units. In 1949 only 1,302,262 units were built. A number of makes of cars, including Ford, Chevrolet and Studebaker had no automatic devices in 1949 but came into the overall picture last year.

Milestones for automatic transmission production were racked up last month by Buick and Chevrolet, Buick turning out its 900,000th Dynaflow and Chevrolet passing the half-million mark with its Power-Glide. Hydra-matic, used in other General Motors cars and in five independents, is the brightest star in the automatic transmission firmament, about three million units having been produced.

Improvements in flexibility of this equipment due for early introduction indicate that GM's Detroit transmission division is tied to this design.

Open House for Transmissions

To engender a better understanding of the intricacies of automatic transmission manufacture in machine tool men and in the automotive press, two relative newcomers in the field laid out their red carpets in Cincinnati and Muncie, Ind., recently. Both are producers of the same unit, the Ford-Mercury answer to no-shift driving. Ford's new Automatic Transmission Division Plant at Cincinnati and Borg-Warner's Warner Gear Division Plant at Muncie are its production centers. And both are in a dither because they can't produce enough of the device to satisfy demand or to match competition effectively.

A Little Behind—Ernest R. Breech,

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Ford executive vice president, says: "During the first quarter of this year, 18 per cent of the Fords we sold were equipped with automatic transmissions, while 33 per cent of the Chevrolets sold had automatic transmissions. We were able to put automatic transmissions on only 30 per cent of our Mercurys while Pontiac equipped 66 per cent, Oldsmobile 99 per cent and Buick 75 per cent of their production with automatic transmissions."

That situation rankles the more because Ford's plant lays claims to being "the finest, most modern automatic transmission plant in the world," and Warner Gear's is also new in the section devoted to the unit's manufacture. Mr. Breech said the outlay for machines, tools and equipment in the Cincinnati plant was $17.5 million.

Half Capacity—Production at the two plants is held to less than 50 per cent of capacity by restrictions on aluminum and copper consumption. To make the reduced number of transmissions, furthermore has required special authorization from NPA because neither plant was in operation during the base period from which materials consumption is figured. By tightening the screws on copper and aluminum consumption in third quarter still more, NPA has made Ford's management fighting mad.

The designers of the transmission have gone about as far as they want to go in changing materials. The transmission extension housing, designed as an aluminum casting, has been redesigned in gray iron and one or two miscellaneous pump parts, formerly aluminum die cast, are also in iron. Materials used in the unit break down this way: 130 parts are carbon steel, the turbine assembly accounting for most of these stampings; 99 parts, primarily in the planetary gearbox, are alloy steels; 24 parts are aluminum alloy die castings; copper and lead base alloys account for 20 parts; and another 20 are of rubber and cork. The remaining 15 parts of the assembly are gray iron castings. Some thought is being given to using magnesium castings, but the "relative criticality," to use Washington's circuitous language, of this material has not been explored thoroughly enough to determine whether the change would net greater output. Aluminum, it is thought, will become easier to obtain later this year, so the tendency is to go slow in making any more changes.

On Its Own Feet—Ford's automatic transmission plant is one of the company's most self-sufficient operations.

Auto, Truck Output

U. S. and Canada

	1951	1950
January	645,688	609,878
February	658,918	505,593
March	802,737	610,680
April	684,144	585,705
May	695,000*	732,161
June		897,853
July		746,801
August		842,335
September		760,847
October		796,010
November		633,874
December		671,622
Week Ended	**1951**	**1950**
May 12	158,502	174,480
May 19	156,111	178,314
May 26	160,325	186,249
June 2	128,000*	146,825

Sources: Automobile Manufacturers Association, Ward's Automotive Reports. *Preliminary.

Aside from its raw materials and castings and forgings and fasteners, the transmission's parts are all fabricated in the new plant. More than 700 machine tools are required in the process. Warner Gear's Muncie operation is less self-contained, all stamped components, for example, coming from outside.

At Cincinnati nearly 100 of the machine tools are special purpose units since the automatic transmission requires tolerances and machining techniques not necessary anywhere else in automobile manufacture. In some operations, such as finish machining of the transmission's upper and lower control valve body, tolerances to 0.0003-in. are required.

New Methods—Machining of the transmission's front and rear pump bodies is one example of new metal-removing technique. In this operation an indexing-type machining completely finishes the pump's eccentric cavity in one continuous operation. Punching of the vane slots in the transmission's turbine shell is another operation where new tools and processes are evident. A rotary-type machine pierces these slots with the accuracy essential to proper operation of the turbine.

Machining of the transmission case is the most spectacular of the plant's operations. Consisting of a line of machine tools joined by conveyors and measuring 152 feet long, this transfer machine performs 190 operations at 76 stations. Operated by two men, the machine mills, drills, bores and spotfaces the case to the extent that when the part emerges it requires only three additional simple machining operations before going to final assembly. On this machine's control panel are lights indicating cutting tools. When each tool has completed a predetermined number of cycles, its light comes on to indicate replacement is needed.

The Pressure's On—Assembly is another spot where the high degree of precision in the transmission makes itself evident in the equipment which must be used. The large assembly room is pressurized to keep outside air from entering when the doors are opened. An air-conditioning system keeps the room's atmosphere dust-free.

After final assembly the completed transmission is thoroughly tested in dynamometer-type machines which give a simulated road test. Until this machinery was delivered all transmissions were installed in test cars and run up and down Cincinnati's hills to assure proper functioning. Now a sampling of each day's production is given this treatment to make sure the machine's test results are giving a true picture of performance characteristics.

Who Pays for Standby Plants?

Request by the Navy before the House Armed Services Committee for $35 million to be used for the construction of a plant in the Detroit area spotlights a point of disagreement between industry and the military which hasn't had a mutually satisfactory solution yet.

The government-built plant, which would be operated by Chrysler and used for jet-engine production, if approved, probably will be the first of several in this emergency. Vice Admiral A. G. Noble, Chief of Naval Materiel, told the House group the government must provide plants where private industry is unable or unwilling to put up structures which will have no peacetime application.

There has been considerable friction between defense officials and industry over which should carry the burden of new plants which would be used for standby, but tooled up and capable of full-scale production of combat vehicles and weapons on a moment's notice. Industry has won several rounds in this fight by getting at least token orders for production out of such new plants which so far have been privately financed for the building but financed with public funds for the tooling. Should it be advisable to provide for a non-operating defense industry, manufacturers are taking the position that the whole cost should be government-borne.

The Business Trend

Industrial production remains at high and steady level, yet order backlogs continue to swell as military buying is stepped up

A MOUNTAIN of work for industry is being piled up as defense spending continues its skyward climb. Arms contracts are being placed now at nearly five times the current $1 billion-a-month delivery rate, adding heavily to a backlog already jammed with normal civilian needs and plant-equipment expansion orders. Even with the urgency of the rearmament program, present policy is to maintain a strong civilian economy, and industry has been assigned a double-duty chore. Response to the dual challenge is the outpouring of vast quantities of goods at a terrific rate.

What does the future hold? The ratio of productivity may soon start its much-heralded change as civilian output is throttled and arms deliveries surge. Even the output pace may slacken with holidays, conversion shutdowns, seasonal mending of production facilities and vacation periods eating into overall production time.

While there is much uncertainty as to the future, the present is taking good care of itself. STEEL's industrial production index, on a straight and level high plane since recovery from the rail-switchmen's strike in mid-February, continued in the week ended May 26, with the index remaining at 218 per cent of the 1936-1939 average. The prior week's final mark was 218; that of a year ago, 210.

Auto Assemblies Gain . . .

Contributing materially to the stability of the index in spite of its materials hobbles is the auto industry. It was estimated by *Ward's Automotive Reports* to have turned out 655,000 cars and trucks from U. S. plants in May, substantially over any month's total this year, except March's 746,000. With June prospects for 470,000 U. S. passenger car completions, the industry's second quarter volume should wind up only 9 per cent below the first, and add up to the second-best January-June volume in history.

The weekly pace is being maintained in U. S. and Canadian plants with assemblies expected to total 160,325 units in the six days ended May 26, up over 4000 units from the 156,111 of the previous week when Canadian plants were closed in observance of Empire Day. A mark of 186,249 assemblies was chalked up in 1950's comparative week. Industry-wide observance of Memorial Day will probably knock 20 per cent off U. S. weekly assemblies; in addition, three-day "materials holidays" will be taken by several producers.

Muscles of Steel . . .

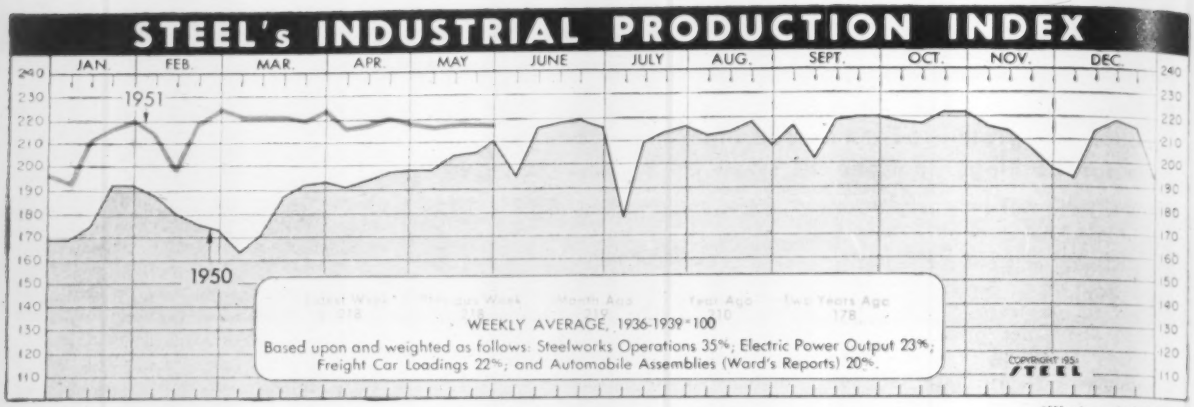
The torrent of steel continues, with mills scheduled to operate above capacity again in the week ended June 2. This rate should bring forth 2,053,000 tons of steel for ingots and castings. The tonnage will be a slight decline from the turnout of 2,071,000 tons the week before. A year ago, even at above-capacity operation, the yield was only 1,934,900 net tons.

Coal Tempo Quickens . . .

Mining of bituminous coal is again inching upward, though still behind weekly comparison figures of a year

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	103.5	104.0	103.5	101.0
	Electric Power Distributed (million kilowatt hours)	6,560	6,559	6,674	5,894
	Bituminous Coal Production (daily av.—1000 tons)	1,621	1,603	1,761	1,624
	Petroleum Production (daily av.—1000 bbl.)	6,175	6,177	6,154	5,118
	Construction Volume (ENR—Unit $1,000,000)	$177.1	$151.8	$284.7	$291.2
	Automobile and Truck Output (Ward's—number units)	160,405	156,217	162,740	186,249
	*Dates on request. †Weekly capacities, net tons: 1951, 1,999,035; 1st half 1950, 1,906,268; 2nd half 1950, 1,928,721.				
TRADE	Freight Car Loadings (unit—1000 cars)	810†	809	825	781
	Business Failures (Dun & Bradstreet, number)	170	171	162	214
	Currency in Circulation (in millions of dollars)‡	$27,251	$27,287	$27,122	$26,908
	Department Store Sales (changes from like wk. a yr. ago)‡	+4%	+3%	+1%	+2%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$16,316	$15,490	$16,103	$14,032
	Federal Gross Debt (billions)	$254.8	$254.7	$254.7	$256.1
	Bond Volume, NYSE (millions)	$17.1	$15.0	$17.2	$18.4
	Stocks Sales, NYSE (thousands of shares)	8,780	8,577	8,782	8,200
	Loans and Investments (billions)†	$69.6	$69.4	$69.8	$66.7
	United States Gov't. Obligations Held (millions)†	$30,425	$30,339	$36,750	$36,251
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	171.92	171.92	171.92	156.13
	STEEL's Nonferrous Metal Price Index‡	241.6	241.6	243.0	173.9
	All Commodities†	182.4	182.2	183.6	156.3
	Metals and Metal Products†	189.5	189.5	189.6	170.1
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				



*Week ended May 26

ago. Production in the week ended May 19 was estimated by the National Coal Association to be 9,725,000 net tons, up slightly from the 9,620,000 tons mined the week before, and near the 9,743,000 net ton yield of 1950's comparative week. Tonnage produced in 1951 to May 19 was approximately 205,695,000 tons, bettering the 174,333,000 tons dug in 1950 through May 20, a period of the short work-week.

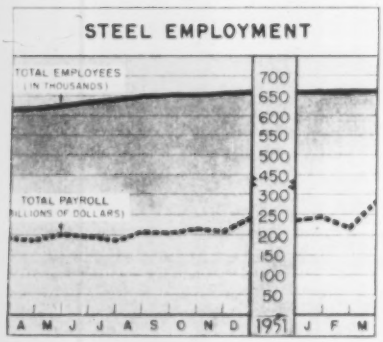
Plants Top $2 Billion . . .

Attempts to create new productive capacity rather than simply replace or modernize existing facilities are evident in the report of industrial building awards smashing through the $2 billion mark. Engineering contracts awarded for plants this year up to May 24 totaled $2001 million, says *Engineering News-Record*, an increase of 317 per cent over 1950, as contrasted with a 40 per cent drop in private housing contracts for the same period. In the week ended May 24, plant awards amounted to $22.9 million of the $177 million total engineering construction volume. The total figure is 37 per cent below the average week to date this year and 39 per cent below the same week of 1950, reflecting clearly the curbs on building credit.

Price Skid Reversed . . .

Wholesale prices reversed a month-long slide during the week ended May 22 and inched up to 182.4 per cent of the 1926 average, up from the 182.2 per cent standing of the week before. The rise was caused primarily by higher prices for livestock. Wholesale prices of iron and steel are now about 169 per cent of the June, 1946, average, as against 153 in the pre-Korea period. Average price rise for all commodities other than farm product and foodstuffs is 17 per cent.

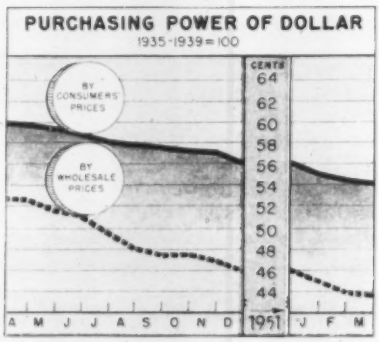
Consumers' prices generally kept with the pace of the wholesale index



Steel Employment, Payrolls

	Employees† in Thousands		Payrolls in Millions	
	1951	1950	1951	1950
Jan.	657	609	$245.3	$189.3
Feb.	663	613	219.4	174.7
Mar.	663	616	238.3	190.0
Apr.	....	621	....	186.2
May	....	628	....	199.9
June	....	636	....	195.3
July	....	643	....	188.7
Aug.	....	649	....	206.6
Sept.	....	650	....	203.8
Oct.	....	650	....	212.2
Nov.	....	653	....	208.0
Dec.	....	657	....	235.0

† Monthly average. American Iron & Steel Institute

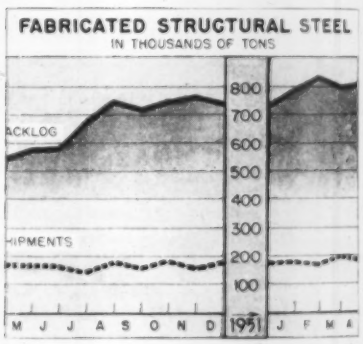


Purchasing Power of the Dollar

Cents, as measured by:

	Wholesale Prices		Consumers' Prices	
	1951	1950	1951	1950
Jan.	44.7	53.1	55.1	59.5
Feb.	43.9	52.7	54.4	59.6
Mar.	43.8	52.7	54.2	59.4
Apr.	....	52.6	....	59.3
May	....	51.6	....	59.1
June	....	51.2	....	58.8
July	....	49.4	....	58.1
Aug.	....	48.3	....	57.7
Sept.	....	47.5	....	57.3
Oct.	....	47.5	....	56.9
Nov.	....	46.8	....	56.7
Dec.	....	45.8*	....	55.9

U. S. Office of Business Economics



Fabricated Structural Steel

Thousands of Net Tons

	Shipments		Backlog	
	1951	1950	1951	1950
Jan.	187.0	135.2	788	565
Feb.	168.4	129.6	830	565
Mar.	203.8	156.8	798	556
Apr.	192.6	164.4	807	540
May	....	168.1	....	578
June	....	172.1	....	580
July	....	141.6	....	684
Aug.	....	180.7	....	741
Sept.	....	157.0	....	716
Oct.	....	183.3	....	747
Nov.	....	167.1	....	763
Dec.	....	175.6	....	736
Total	....	1,931.5	....	....

American Institute of Steel Construction

Charts—Copyright 1951, STEEL

between mid-March and mid-April, according to the Bureau of Labor Statistics. The index for Apr. 15 stood at 184.6 per cent of the 1935-1939 average, 8.5 per cent higher than the index for June, 1950, and 9.6 per cent above a year ago.

Workweek Stretches . . .

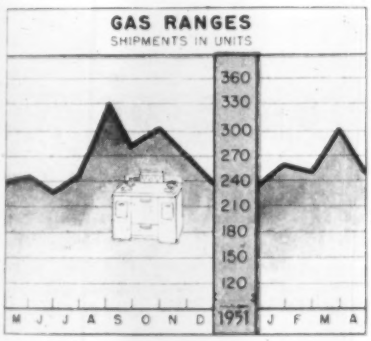
The challenge of higher production is causing factory workers to put in longer hours. Workweek of the nation's 13 million workers in manufacturing plants stood at 40.8 hours in mid-April, says the Labor Department, about the same level that has been maintained since last August. However, metalworking plants outside the auto industry exceeded a 41-hour average, while machinery, ordnance and instrument industries gained 2 hours or more working time per employee over a year's time. Employment reductions in plants turning out autos and other consumer durables were somewhat offset by the sharp upsweep in hirings by the higher-paid hard-goods plants with arms work. Gross weekly earnings of factory production workers averaged $64.22, and gross hourly earnings $1.57. These figures are, respectively, $7.29 and $0.14 above the levels of a year ago.

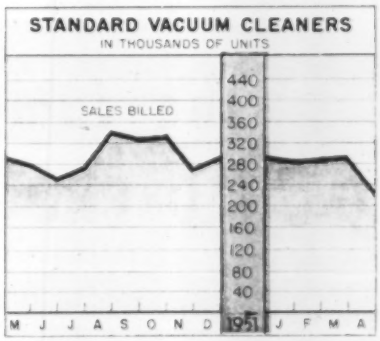
Trends Fore and Aft . . .

American business plans to spend a record $23.9 billion for new facilities in 1951, a survey by the Securities & Exchange Commission and Department of Commerce shows. . .Gear sales dropped nearly 11 per cent in April from the March total. The American Gear Manufacturers Association index for the month is at 742.5 per cent of the 1935-1939 average. . .Export sales of American automobiles reached 45,672 units in April, about 7 per cent of the industry's total output for the month and a gain of 137 per cent over April, 1950. . .Sales of household laundry appliances dropped an average of about 25 per cent in April, after a rather good first-quarter performance. . .At the current rate of defense spending, national income could be well over $300 billion by next year.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Construction	May28	Gray Iron Castings	May28	Ranges, Elec.	May7
Durable Goods	May7	Indus. Production	May21	Refrigerators	May14
Employ., Metalwkg.	May21	Ironers	May14	Steel Castings	May28
Foundry Equip.	May21	Machine Tools	May7	Steel Forgings	Apr.30
Freight Cars	May23	Malleable Castings	May28	Steel Shipments	May21
Furnaces, Indus.	May21	Prices	May14	Wages, Metalwkg.	Apr.16
Furnaces, W. Air	May28	Pumps, New Orders	May14	Washers	May14
Gear Sales	May7	Radio, TV	Apr.23	Water Heaters	Apr.30





Gas Ranges
Shipments in Units

	1951	1950	1949
Jan.	260,600	165,800	106,700
Feb.	254,000	209,000	117,700
Mar.	303,000	264,000	151,500
Apr.	249,600	239,100	150,100
May	.....	242,800	151,600
June	.....	217,000	162,200
July	.....	254,800	125,800
Aug.	.....	331,500	206,100
Sept.	.....	287,000	227,300
Oct.	.....	308,000	257,500
Nov.	.....	269,100	237,400
Dec.	.....	235,900	175,700
Total	.....	3,023,200	2,069,600

Gas Appliance Mfrs. Assoc.

Standard Vacuum Cleaners
Sales Billed—Units

	1951	1950	1949
Jan.	282,305	249,150	228,769
Feb.	261,572	263,515	241,267
Mar.	290,242	361,014	309,597
Apr.	227,216	292,664	252,656
May	.....	278,645	222,850
June	.....	250,190	207,354
July	.....	279,967	161,920
Aug.	.....	341,232	219,909
Sept.	.....	327,524	250,036
Oct.	.....	331,445	272,520
Nov.	.....	265,310	253,516
Dec.	.....	288,756	265,513
Total	.....	3,529,412	2,886,514

Vacuum Cleaner Mfrs. Assn.

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Vapor alone does it! Inside this overseas-bound crate, Angier VPI Wrap slowly releases an invisible protective vapor around Shop-Smith that **prevents** rust!

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AND Eliminate costly rejects!

So effective is this proven vapor wrap that rejects due to rust are eliminated! If you ship or store metal parts or products, why not *simplify* your packaging with Angier VPI Wrap and SAVE!

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FREE 20 pages of case studies tell how "VPI" cuts packaging costs.

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PLANTS AT LIMA AND SPRINGFIELD, OHIO

Men of Industry

E. L. CASEY
. . . E. W. Bliss V.P.-mfg.

LUTHER A. KLEBER
. . . V. P.-mfg., General Steel Castings

WILBUR T. CLARK
. . . chief engineer-blast furnaces, Republic

E. L. Casey was elected vice president in charge of manufacturing, **E. W. Bliss Co.,** Canton, O., manufacturer of metalworking presses and rolling mill equipment.

Robert J. Schieder, formerly purchasing agent for **A. E. Bausenbach Inc.,** Buffalo, was appointed head of a new department in production planning and control. He is succeeded as purchasing agent by **Louis Schmidt,** formerly with Uebelhoer Bros.

John F. Welch succeeds **Enno W. Lankenau,** retired, as manager of the Decatur, Ind., plant of **General Electric Co.'s** fractional horsepower motor divisions. **Dr. Louis T. Rader** was appointed assistant manager of engineering, control divisions, Schenectady, N. Y.

Pittsburgh Screw & Bolt Corp., Pittsburgh, elected **John M. Auty** a vice president, and **William R. Koester,** secretary and treasurer. **Alexander I. Stayman** was appointed assistant to the president; **Thomas Toby,** assistant general manager of sales; **Gerald J. Garvey** and **Robert W. Dierker,** president and vice president of sales, respectively, of Gary Screw & Bolt Division, Gary, Ind.; and **Dale W. Patrick,** manager of sales, Colona Division, Monaca, Pa.

George T. Morse Jr. was elected president and general manager of **Peden Iron & Steel Co.,** Houston. Associated with the company since 1928, he has been vice president in charge of industrial sales. **W. E. Blumberg** was appointed sales manager, industrial division.

General Steel Castings Corp., Granite City, Ill., elected **Luther A. Kleber** vice president of manufacturing. **Harry E. Thiele,** vice president with duties to be assigned by the president, and **J. Ellis Turner,** vice president in charge of industrial relations.

Albert G. Lauzon was elected president, **Buckeye Tools Corp.,** Dayton, O. **Hal O. Gummere** was elected vice president and general manager. **Ervin Reeves** was named treasurer and **Earl Hamilton,** secretary. **E. B. Meynard** was appointed sales manager and **Dave Thomas,** plant superintendent.

Joseph H. Woodward II was named director of public relations, **Woodward Iron Co.,** Birmingham. Mr. Woodward resigned as secretary and is succeeded in that position by **D. T. Turnbull,** who in turn is succeeded as treasurer by **J. M. Goodson. Earl M. Owens** was appointed auditor.

Leo S. Banul was appointed manager of the Chicago warehouse of **Bliss & Laughlin Inc.,** succeeding acting manager, **Charles W. Zerler,** who was moved to the company's sales department.

George P. Stanton was elected treasurer of **Stanton Foundry Inc.,** Syracuse, N. Y.

James J. Collins, general manager, was appointed vice president and general manager of **Iron & Steel Products Inc.,** Chicago. **Edward J. Sagert,** assistant to the executive vice president, was appointed vice president. **William J. Parker II,** superintendent, was appointed general superintendent and is succeeded as superintendent by **Warren C. Stevens.**

Wilbur T. Clark was appointed chief engineer of blast furnaces for **Republic Steel Corp.,** Cleveland. Succeeding Mr. Clark as assistant chief engineer, Cleveland district, is **Roy W. Kroeger.**

Gaylord Container Corp., St. Louis, named **G. Gordon Hertslet** to head its newly formed customer public relations and advertising departments.

Russel B. Caples was elected president of **American Zinc Institute,** New York. Mr. Caples, who is manager of the Anaconda Copper Mining Co.'s operations at Great Falls, Mont., succeeds **Edward H. Snyder,** who has held the office since 1949. Three vice presidents were also elected to office: **H. D. Carus,** Matthiessen & Hegeler Zinc Co.; **Elmer Isern,** Eagle-Picher Mining & Smelting Co.; and **G. Howard Lefevre,** U. S. Smelting, Refining & Mining Co.

W. E. Haarbauer was appointed factory manager, **Reynolds Wire Division,** National-Standard Co., Dixon, Ill. **W. O. Anthony** was appointed assistant factory manager, chief engineer, of the division.

Gordon Miscall joined **Parker Appliance Co.,** Cleveland, as industrial sales engineer. He will cover southern Ohio, western Pennsylvania, West Virginia and Kentucky. Mr. Miscall succeeds **H. C. Jacobs,** who now represents the company in northern Ohio and Indiana, an area previously served by **C. D. Uldricks,** presently Pacific Coast representative in Los Angeles.

N. F. Roleson was appointed assistant manager, marketing and analysis de-

partment, **Nash Motors Division,** Nash-Kelvinator Corp., Detroit.

William S. DuBois has joined **Harbison-Walker Refractories Co.,** Pittsburgh, to head its newly created department of market research. He was senior market analyst for Firestone Tire & Rubber Co.

WILIAM S. DuBOIS
heads new Harbison-Walker division

G. W. Reese, formerly assistant general manager of manufacture, **American Can Co.,** New York, succeeds **S. D. Arms** as general manager-manufacture. Mr. Arms was elected vice president in charge of the company's Atlantic division. **F. J. Green** and **C. F. Lausten,** formerly managers of manufacture in the firm's Atlantic and Pacific divisions, respectively, were named assistant general managers of manufacture. In their new posts they succeed **R. F. Hepenstal,** elected vice president in charge of manufacture, and Mr. Reese. **R. B. Thompson** and **A. T. Augensen,** formerly assistant managers of manufacture in the Atlantic and Pacific divisions, respectively, were promoted to managers of manufacture of the divisions in which they held their previous positions.

Walter K. Palmer, accounting manager for **Kaiser Steel Corp.,** Oakland, Calif., was appointed an assistant controller and director of cost control. He recently was transferred to the company's Oakland headquarters from the steel plant at Fontana, Calif.

Two new mill and industrial representatives assigned to new territory by **E. C. Atkins & Co.,** Indianapolis, are: **T. W. Potter,** transferred from Pittsburgh to St. Louis, and **George A. Hines,** who succeeds Mr. Potter in Pittsburgh. **Maurice R. Greeson** will serve the company in western New York and northwestern Pennsylvania.

Warren Carhart was promoted to supervisor of application engineering at the Lynwood plant of **Western Gear Works,** Seattle.

Allan Hoover of Pasadena, Calif., and President-elect **Deane W. Malott** of Cornell University were elected directors of **Pitney-Bowes Inc.,** Stamford, Conn. The elections increase the postage meter company's board to nine.

W. T. Stevenson was elected president of **Texas Gas Transmission Corp.,** New York. **J. H. Hillman Jr.,** formerly president and chairman, continues in the latter position.

Anthony J. Zino Jr. was appointed domestic general sales manager of **Joseph Dixon Crucible Co.,** with headquarters in Jersey City, N. J. He has had 17 years' experience in varied phases of sales management with such firms as E. F. Houghton & Co., Lubri-Zol Corp. and Swan-Finch Oil Corp.

ANTHONY J. ZINO JR.
dom. gen. sales mgr., Dixon Crucible

Richard T. Nalle was elected to the board of directors of **York Corp.,** York, Pa. He fills the vacancy on the board created by the death of **William S. Shipley.** Mr. Nalle is president of Midvale Co.

Gerald J. McNerney was appointed superintendent of the body division of **Studebaker Corp.,** South Bend, Ind. He succeeds **Clarence H. Smith,** now manager of Studebaker's aviation plant in Chicago.

Appointments in the new gas turbine plant of **Lincoln-Mercury Division,** Ford Motor Co., Detroit, include: **Owen L. Marsal,** named manufacturing manager; **R. E. Bussy,** chief product engineer on the J-40 program and **H. F. Roberts,** purchasing agent.

Paul S. Kempf was appointed manager of industrial relations, **Inland Steel Products Co.,** Milwaukee, manufacturing subsidiary of Inland Steel Co.

Charles Wyte, senior engineer in charge of tool planning, plant contact and electrical design in the production engineering section of **Fisher Body Division,** General Motors Corp., Detroit, was promoted to assistant director of the section.

In the laboratory staff of research and technology department, **United States Steel Co.,** Pittsburgh, **Dudley H. Rowland** was made assistant to the manager. **J. G. Donelson** is supervisor, research associates, and will co-ordinate all research activities in chemical engineering and general chemistry. Research associates are **Raymond B. Hoxeng,** supervisor of programs concerned with electroplating, physical chemistry and corrosion; **Paul Marshall,** physical metallurgy; **Shadburn Marshall,** process metallurgy; **R. L. Stephenson,** research concerning blast furnace developments; and **Joseph H. Wells,** chemical engineering, organic chemistry, and coal and coke technology.

J. S. Roscoe was appointed director of purchasing, **Lincoln Electric Co.,** Cleveland. Associated with the company since 1924, he has been active since then as a welding engineer and district manager. Since 1947 he was district manager in the Chicago area.

Automatic Steel Products Inc., Canton, O., elected **Douglas H. Miller** as treasurer. Mr. Miller was with Alexander Grant & Co., certified pub-

DOUGLAS H. MILLER
treasurer of Automatic Steel Products

ROGER F. DUNN

Graver's new secretary and treasurer

JOHN SEAGREN

. . . chief engineer, Nat'l Supply's engine div.

DAVID E. FEINBERG

. . . a V. P. of U. S. Air Conditioning

he accountant and auditor for Automatic and its affiliates.

Roger F. Dunn was elected secretary and treasurer of **Graver Tank & Mfg. Co. Inc.**, E. Chicago, Ind., to succeed **B. B. McCandliss,** who was named senior vice president. **Dr. Erwin Wetterstrom** joined the company's research and development staff as analytical engineer, and will deal with problems concerning storage of volatile liquids.

T. C. Finnell was appointed assistant manager, application engineering department, **Westinghouse Electric Corp.'s** motor and control division, Buffalo. Formerly manager of the metallic rectifier section, Mr. Finnell succeeds **T. R. Lawson,** transferred to company headquarters in Pittsburgh. **Mark F. Slusser** was appointed administrative assistant, industrial products sales.

Leo F. Brown was appointed works manager of the Ambridge, Pa., plant of **National Electric Products Corp.**

John Seagren was appointed chief engineer of **National Supply Co.'s** engine division, Springfield, O. **Harvey W. Hanners** and **George F. Noltein** were appointed chief research engineer and consulting engineer, respectively. Mr. Seagren joined National Supply in July when that company purchased the engine division assets of Atlas Imperial Diesel Engine Co. with which he had been associated.

Richard E. Sweitzer was appointed sales promotion and advertising manager for **Trion Inc.,** McKees Rocks, Pa. He had been in the sales department of Carnegie-Illinois Steel Corp.

Edward J. Brichta was appointed sales manager, industrial air-cooled engine division, **Continental Motors Corp.,** Muskegon, Mich.

Oliver Corp., Chicago, appointed **J. R. Mohlie** works manager, heavy line plants, and **R. G. Rogers,** works manager, light line plants. **N. O. Panzegrau** was named to succeed Mr. **Mohlie** as director of defense operations.

David E. Feinberg was appointed a vice president of **United States Air Conditioning Corp.,** Minneapolis. Since 1949 he was manager, refrigeration division.

Arthur Colton Co., division of Snyder Tool & Engineering Co., announces appointment of **Louis H. Fischer** to the staff of **Miller Sales Agency,** its representative in Chicago. He will act in the capacity of sales engineer.

T. A. Sims was appointed assistant general manager of **Hamilton Standard Division,** United Aircraft Corp., East Hartford, Conn. He is leaving his post as general manager of the Air Force's NEPA project and as a vice president of Fairchild Engine & Airplane Corp. to assume his new duties with Hamilton Standard.

Joseph E. Erickson, sales engineer, highway and buildings products division, **Bethlehem Steel Co.,** was transferred from the company's Chicago district office to the St. Paul district office.

OBITUARIES . . .

Eugene J. McCleary, 61, manager, blast furnace division, **Great Lakes Steel Corp.,** Ecorse, Mich., for 21 years, died May 20.

William T. Wamsley, 63, manager of the Kansas City, Mo., warehouse of **Wheeling Corrugating Co.,** died May 24. He was manager of that branch for 18 years.

Franklin W. Olin, 91, founder of **Olin Industries Inc.,** East Alton, Ill., died May 21.

Ward S. Patterson, 46, executive assistant to the vice president in charge of engineering of **Combustion Engineering-Superheater Inc.,** New York, died May 21.

T. M. Heermans, 62, assistant manager of sales, centrifugal pump department, **Allis-Chalmers Mfg. Co.,** Milwaukee, died May 17.

Burrell T. Dye, 55, superintendent of industrial relations, Buffalo plant, **Republic Steel Corp.,** died May 20. He joined Republic in 1933 at the Warren, O. Works, and transferred to Buffalo in 1940.

William J. Campbell, 55, New York administrative assistant for **Pitney-Bowes Inc.,** postage meter company of Stamford, Conn., died May 25.

Robert I. Wiswell, owner of **Cleveland Steel Casting Co.,** Cleveland, died May 21.

John J. Sullivan, 29, secretary-treasurer, **Republic Powdered Metals Co.,** Cleveland, and former treasurer of Basic Metals Corp., died May 25.

Clarence W. Pierce, 73, chairman of the board of directors of **Modern Bond Corp.,** Wilmington, Del., died May 21.

Ralph Cunningham, 61, vice president and director of **General Box Co.** and manager of its Detroit division, died May 17.

SEND FOR THIS CATALOG

IT MAY HELP YOU IN YOUR PRESENT OR FUTURE PRODUCTION PROBLEMS

The wide scope of fabrication-by-welding of components and finished parts produced by American Welding is covered in this catalog. We have the "know-how" and the "know-why" because we've been at it for over thirty years. Let us send you a copy — it may lead to definite savings in your present and future products.

Pictorially illustrates American Welding's research, engineering, and production facilities available to manufacturers whose products lend themselves to any welding procedure.

THE AW AMERICAN WELDING & MANUFACTURING CO. · WARREN, OHIO

Production AND Engineering NEWS AT A GLANCE

CHECKING ON SUPPLIERS—Study of raw materials and parts purchased by Western Electric for further manufacturing into completed items revealed some interesting data on quality. Covering a two-month period during which 6847 separate lots were shipped from 514 suppliers into one plant, receiving inspection by the buyer showed 69 per cent or 4709 of all lots were nonconforming, these being furnished by one-third of the suppliers involved. All of the lots shipped by 22 suppliers were nonconforming. Importance of centralized inspection of purchased materials at their source is shown by the fact Western Electric has as its supplies inspection organization a group of some 170, comprising 120 inspectors together with the necessary staff and administrative personnel. Most of the inspectors are located in areas close to sources of supply, there being 60 such basic locations throughout the country, handling 1000 suppliers.

PRESSURE TO SAVE SCRAP—Extruding stepped-diameter parts such as transmission shafts, studs and similar components from steel bars and slugs embodies major advantages in mass production, the main one being no scrap. One manufacturer doing the work reports size can be held within 0.001-0.002-inch on the diameter, reducing machining to a minimum. In the actual extrusion process, bars or slugs are given a chemical surface treatment in a heated bath which produces a strong crystalline deposit of zinc phosphate in a soap base. This takes the form of a dark shiny coating, serving as a drawing compound of sufficient adherence to remain on the part after extrusion.

MAYBE YOU CAN SPIN IT—Spinning a variety of metal shapes in many different materials, including some stainless steels normally considered difficult to work, has been adapted to a mass production basis, with close tolerances maintained on the finished part. Re-design of a metal part to permit production by spinning often may prove a cost-saving change. —p. 88

RIVETS, WELDS COMBINED—In assembling spring steel blades and forged aluminum handles for plasterers' trowels, an interesting procedure was worked out by the manufacturer. A small low-carbon steel rivet is placed in each of the drilled holes through blades and handles. The flat-head rivet contacts the edge of the drilled hole which acts as an annular projection for a subsequent weld made in a bench welder. The annealing effect of the weld brings metallurgical characteristics of the metals closer to a common wearing quality, neither rivet nor blade wearing faster than the other. The slight burr left by the rivet head is buffed off, the trowel turned over and the protruding shank of the rivet cold headed to the aluminum and finished.

ESSENTIALS OF NICKEL PLATING—Understanding of the basic features of various types of nickel electroplating systems should be helpful in times like the present when limitations on use of nickel affect so many applications. There are at least seven types of plating baths in use to produce different deposits—hard, soft, bright, etc—to serve requirements involving decoration, corrosion protection, wear resistance or prevention of moisture absorption. —p. 94

DRILLING WITH CARBIDES—Carbide-tipped twist drills are showing excellent performance characteristics in use on cast iron. Speeds up to 200 surface feet per minute with feeds up to 0.013-inch per revolution are reported. As with other carbide tools, the drills should be sharpened before becoming really dull to insure uninterrupted continuity of production and maximum overall tool life. Most all drilling of cast iron has been done dry to hold the range of temperature fluctuation to a minimum. —p. 92

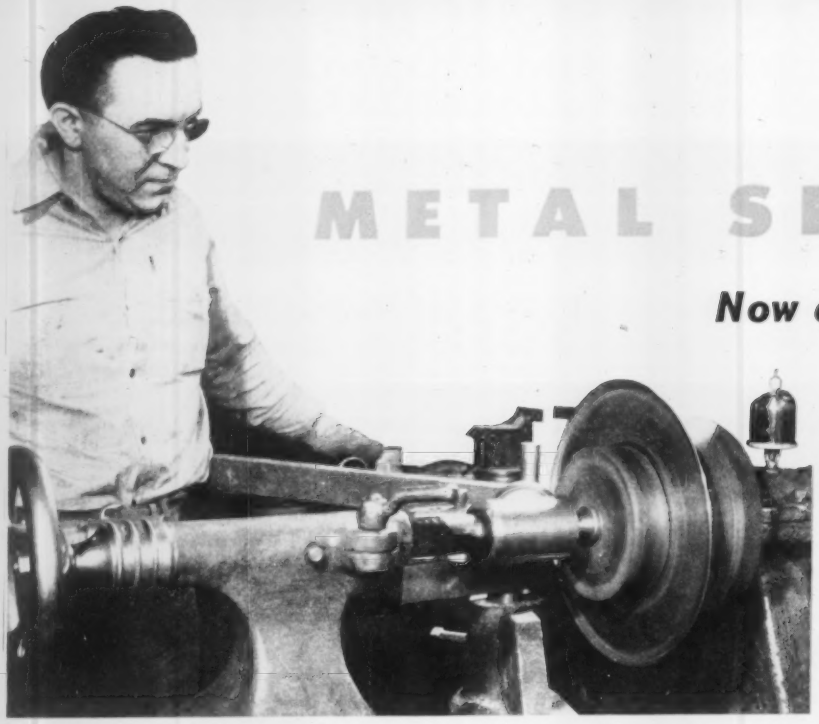
LONG WAY AROUND—Visitor to a forge plant in the Middle West noticed a stock of billets which looked to be a little worse for the wear and upon inquiry was told the steel had been rolled originally in this country "around 1942 or 1943", shipped to a plant in Europe where it was rejected. A few months ago the billets were sold to a buyer here and routed back home at a fairly substantial price. Now they are being processed into automotive forgings, probably setting a new distance and time record in the trip from mill to user.

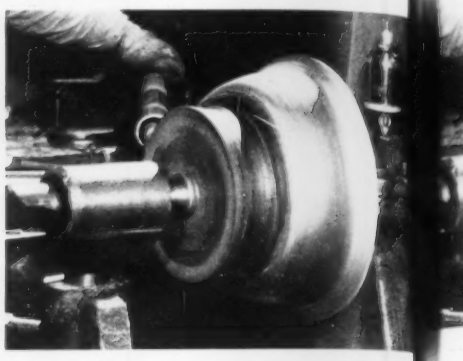
JUST IN PASSING—Addition of the rare earth element cerium to high-alloy irons has resulted in hot workability greatly extending their field of application (p. 98) . . . More than 20 different methods for cladding metals have been developed, only five being in general use today—pressing, casting, direct rolling, sintering and deposition (p. 104) . . . An Ohio company boring tank cannon barrels claims a sevenfold increase in cutting tool life between regrinds following introduction of a new type of chemical coolant.

A.H.A.

METAL SPINNING

Now a mass-production tool





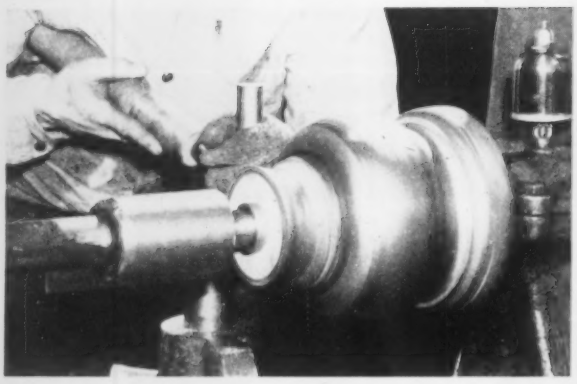
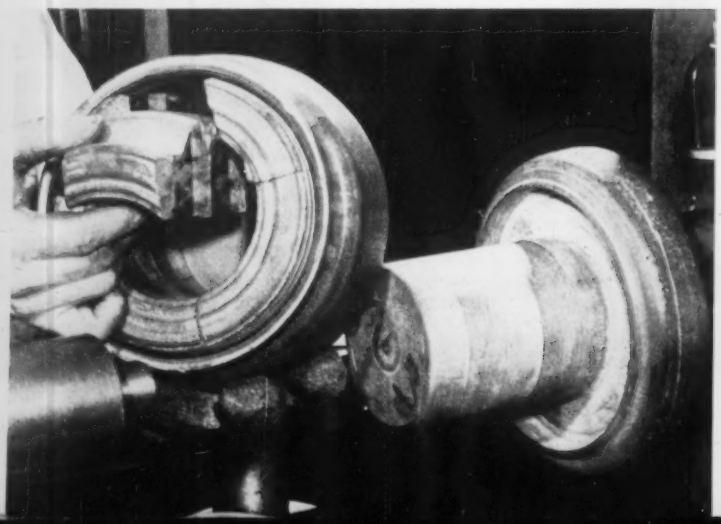
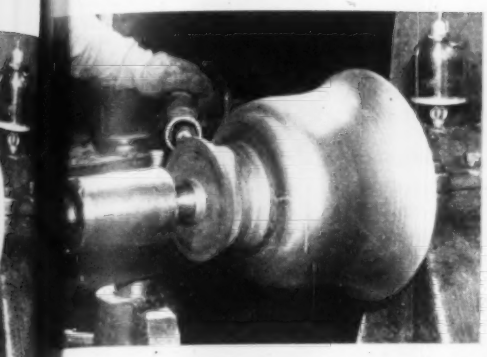


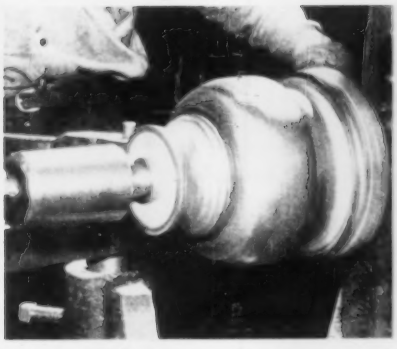
Fig. 1—Steps involved in spinning high-voltage caps of stainless steel are: A—"Breaking" the blank's edge, B—spinning the metal down over the first breakdown block, which is larger in diameter than the finished piece in order to maintain uniform metal thickness, C—spinning shell down over second block to proper diameter in bottom and sidewalls of the cup, D—segments of collapsible block are assembled to the arbor, E—spinning in the neck of the shell to a smaller diameter than the sidewall, F—trimming, turning back to the flange and rolling a bead on the cup's open edge, G—removal of the "key" section of the segmented block followed by its other sections, and H—checking the finished part's critical diameter



fabrication method should be seriously considered, whether your problem is simple or intricate, a highly specialized single project or a mass production operation. Outstanding economies are being realized by use of newly-designed, automatic spinning lathes which easily handle types 430 and 446 stainless alloys—materials which heretofore were considered to be nonformable

By DAN REEBEL
Associate Editor, STEEL





Photography by the author

INVESTIGATION of metal spinning's potentialities—regardless of the metal or alloy used—may offer you lowered production costs in addition to materially stepping up output. A wide variety of products is today being economically produced by this method which eliminates need for costly metalworking tools and dies. A simple wood or steel form—turned to the finished product's shape—is usually all that is needed for a durable long-lasting spinning block. If at a later date, product design changes require block revision—these can be effected economically. This flexibility should not be overlooked when comparing relative costs of spinning and other fabrication methods.

At Spincraft Inc., Milwaukee, one of the world's largest producers of metal-spun parts, jobs usually find their way into production weeks earlier because the necessary spinning blocks can usually be produced in a few days.

Heretofore production runs of 5000 or more pieces were not considered for spinning. However, by use of the company's newly designed mechanical and automatic spinning lathes, such runs today must be individually studied before definite conclusions can be reached regarding the economics of spinning the product. They have handled many jobs exceeding a million pieces on automatic equipment. For instance, stainless steels, type 430 and 446, are automatically formed into truncated cones used for television picture tubes in a matter of 12 seconds. A blank $\frac{1}{8}$-inch thick is drawn to a depth of 14 inches or more at an angle of 24 degrees; sidewall tolerance is held to plus or minus 0.005-inch. Inside surface of the spun cone is completely free of all blemishes. These cones have been produced at the rate of well over a million a year.

Automatic Spinning Broadens Horizon—Spincraft's development of automatic spinning lathes operated by push-button control—is opening a new frontier to all metal fabricators. This method is indicated for many different parts in any quantity from a few pieces to over a million. The automatic spinning unit has a cycle similar to that of a full battery of drawing presses. A blank is placed on the lathe by the operator, a button pushed, and the finished spinning emerges; the equivalent of six to eight operations are automatically performed in a few seconds.

Basically, all metal spinnings are produced as follows: A wood or metal form is turned to the exact shape and dimensions desired in the final spinning. The metal blank is clamped into position in front of the form. Both revolve at speeds varying from 50 to 2400 revolutions per minute. Lower speeds are used for thick and large sections where the heaviest spinning pressures are used, while the higher speeds are indicated for thin small sections. Different adhesive lubricants such as soaps, greases, beeswax, powdered graphite in CCl_4, etc., depending on the material being spun, are applied to the blank to cut down friction. Edge of the revolving blank is frequently bent back approximately $\frac{1}{4}$ to $\frac{1}{2}$-inch to insure rigidity and prevent the metal from buckling during spinning.

The workman next exerts proper pressures on the disk with a long blunt tool, which causes the metal

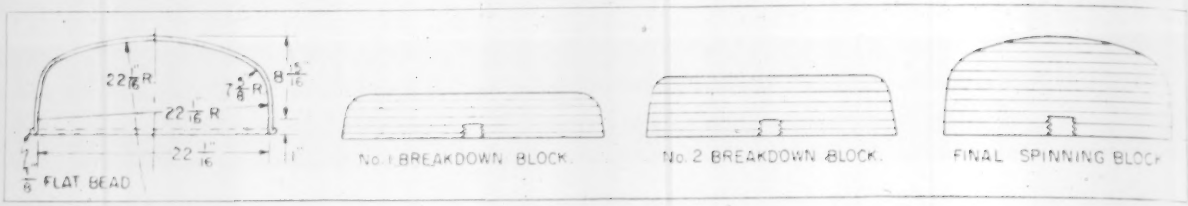


Fig. 2—Detail of finished-spun part and the required spinning blocks used to form the metallic disk

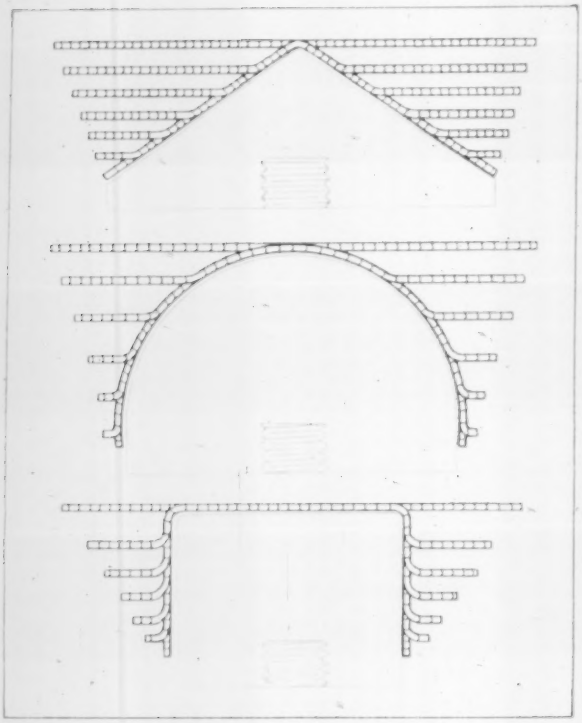
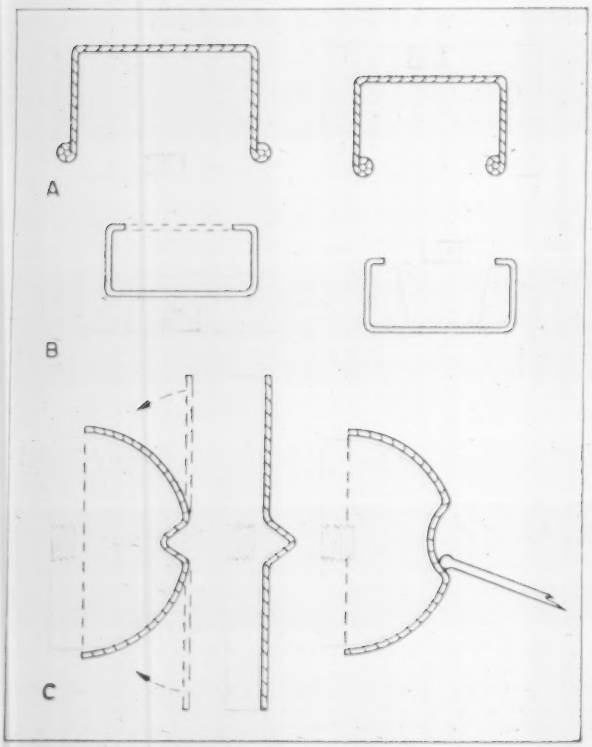


Fig. 3 (left)—Three basic shapes that are successfully spun. The straight-sided cylinder is hardest to produce due to the spinning of sharper angles which puts the metal under greater strain than encountered in the production of the cone or hemisphere

Fig. 4 (below)—Redesigning the spun product can usually lower production costs. On part A an outside bead can be added with a standard beading tool while on the original block, however, an inside bead requires another block to prevent bellying of cylinder edges during beading. This extra operation increases cost. An extra hollow block is required to form the inside flange on part B. If liberal depth and diameter tolerances are allowed, this method is adequate, otherwise an expensive collapsible block must be used for the flanging job. Part C, a hemispherical mixing bowl, was originally designed with a sharp indentation (1) at the base which required an extra block (2) and spinning operation. Changing to a larger radius on the indentation allowed a "push-in" operation (3) on the same block and set-up used for spinning the bowl. This resulted in a sturdier more sanitary product that could be produced faster and cheaper



to flow snugly over the form. Final finishing operations can include trimming, beading or flanging. (See STEEL, page 90, Aug. 15, 1949). Thick gages, hard metals and large diameter disks are worked with a roller or lever-type tool. Shape, size, gage and temper determine the number of breakdown operations required to produce the desired finished shape. Fig. 2 shows the various breakdown blocks needed to produce a typical spun shape.

Straining Determines Ease of Spinning — Easiest and most economical form to shape by spinning is the cone. Even when the material is worked down to its extreme depth, straining is not too severe. More difficult to spin is the hemisphere. As can be noted in Fig. 3, angles grow increasingly sharper as the material is spun down. Hardest shape to produce is a straight-sided cylinder. Sharper angles encountered during the spin-down put the metal under greater strain; more time and greater operator skill are needed to hold accurate tolerances in the finished product. If sharp angles can be eliminated in a spun product, valuable production time will be saved.

Shape, size and metal gage all must be considered when spinning is contemplated as a production method. All factors are interrelated: Shape depends on size and metal gage; size on shape and gage requirements; and gage on shape and size. Tolerances desired

ADAPTABILITY OF METALS TO SPINNING

... unit 1.00 is given to the type of material in each classification ... lends itself most readily to forming by the cold metal spinning ... The lower the percentage figure, the higher the cost. These ... will vary somewhat depending on special circumstances such ... contour of article to be spun, gage, size, etc.

Group I—Aluminum and the Alloys

Type	Shallow Spinning	Deep Spinning
2S0	1.00	1.00
3S0	1.00	.99
24S0	.65	.45
52S0	.80	.55
61S0	.90	.80

Group II—Copper and Its Alloys

Copper—cold rolled annealed	1.00	1.00
Copper—hot rolled	.99	.88
Yellow brass (deep drawing brass, cartridge brass, eyelet brass)	.99	.92
Low brass	.96	.80
Red brass	.90	.83
Commercial bronze	.88	.80
Gilding metal	.85	.75
Admiralty brass	.82	.70
Naval brass	.75	.45
Muntz metal	.55	.30
Phosphor bronze—grade A	.85	.40
Phosphor bronze—grade C	.85	.45
Cupro nickel 70-30	.95	.65
Nickel silver grade A	.95	.65
Silicon bronze (Everdur, Olympic Metal Duronze, Herculoy)	.94	.60

Group III—Common Steels SAE 1010-15-20 and Miscellaneous Steels

Cold rolled deep drawing quality	1.00	1.00
Vitreous enameling, deep drawing and spinning quality	1.00	.95
Standard cold rolled	1.00	.92
Hot rolled pickled and oiled	1.00	.92
Hot rolled low carbon	.90	.35
Hot rolled copper bearing	.88	.51
Lead coated (long terne)	1.00	Impractical*
Galvannealed	1.00	Impractical*
Galvanized	.90	Impractical*
High tensile steels	.45	.15
Carbon 0.40% and upward	.25	.10

*Coating will flake off

Group IV—Stainless Steels

Type	Shallow Spinning	Deep Spinning
302 18-8	.98	.60
304 18-8	.98	.90
305 18-11 free spinning	1.00	1.00
309S 25-12	.80	.45
316 18-8 (molybdenum)	.90	.60
321 18-8 (titanium)	.85	.50
347 18-8 (columbium)	.90	.50
430 17 (chromium—no nickel)	.90	.50

Group V—Nickel and Nickel Alloys

Monel—spinning quality	1.00	.90
Monel—special cold rolled soft temper	1.00	.85
Inconel	.90	.70
"L" Nickel	1.00	1.00
Nickel	1.00	.92
Multimet N-155	.90	.50
Hastelloy A	.75	.35
Hastelloy B	.70	.30
Hastelloy C	.50	.10

Group VI—Miscellaneous

Lead	.96	.90
Pewter	1.00	.99
Zinc	1.00	1.00
Tantalum	.86	.45
Magnesium	.80**	.45**
Molybdenum	.55**	.15**

**For all practical purposes these metals must be hot-spun.

Summary

Following is a comparison of the best metal in each of the above groups. Here also a great deal depends upon individual circumstances surrounding the job:

Aluminum 2 So	1.00
Zinc	.94
Steel, cold rolled deep drawing quality	.91
Copper, cold rolled annealed	.87
Nickel	.86
Stainless steel type 305	.70

There are other metals and special alloys which are not so commonly used but which can be spun. Many of them require special handling. Some of these are gold, silver, platinum, kovar, invar, ilium.

Note: The foregoing analysis applies to manual metal spinning by the cold working method. Where quantities warrant special automatic spinning setups or where existing automatic setups can be used, difficult to form metals, even type 446 chrome iron or Haynes Stellite alloy 25 for example, can readily be deep spun. The deep spinning percentages listed above then become void.

and quantities involved have an important bearing on whether a product can be most economically produced by spinning or other methods.

A shape must be generally concentric or round to be produced by the spinning technique. It can be a straight cylinder having the same diameter throughout, or it can be a hemisphere, cone, partial circle or any segment of a circle. Concentric details can also be spun into any part of either a square or rectangular sheet. Diameters of spinning can be projected from ¼-inch to 12 feet. Most all types of sheet metal can be spun. Adaptability of the various metals is shown in the accompanying table.

Thickness Specifications for Spinning—As a rule, simple shapes can be spun in thicknesses up to ¼-inch for soft metals, about 3/16-inch for low carbon steels and about ⅛-inch for stainless steel. Standard limits for maximum spinning economy are plus or minus ⅛-inch for diameters beyond 36 inches, plus or minus 1/16-inch for medium sizes which range from 18 to 36 inches, and plus or minus 1/32-inch for diameters under 18 inches. Tolerance limits of a few thousandths of an inch can be spun; however, this greatly increases costs.

Often spinning costs can be materially reduced by various design changes that consider the operations involved. Very often these simple modifications produce improved product appearance and increase the metal's structural strength. Certain manufacturers' case histories are detailed in Fig. 4, to show some constructive suggestions offered by Spincraft's engineers which realized worthwhile cost savings in the spinning operation.

On parts involving complex design such as narrow throats and other variances in the product's diameter, hollow collapsible blocks or internal rolls are required. Some particular shapes can be produced only on the blocks, while others can be spun by either method. Where quantities permit, off-center type internal roller devices are frequently used, which eliminate handling (block assembly and disassembly). This offers much greater production economy. An operation involving use of collapsible blocks is the spinning of a high-voltage cap whose defense use was undisclosed by Spincraft engineers. This is shown in Fig. 1. The part is spun from 20-gage type 305 stainless steel.

Six Operations Do The Job—Operational sequence of this job includes: (*Please turn to Page* 114)

How to Drill Cast Iron with Carbide Tipped Twist Drills

Left — Closeup of standard carbide twist drill tip

Right — Carbide tipped standard twist drill. These drills are made by inserting standard carbide tips in the end of conventional high speed steel twist drills

Increased production and longer tool life are being obtained, using conventional machines to drill cast iron at high speeds

By FRED W. LUCHT
Carboloy Co. Inc.
Detroit

PRODUCTION applications of cemented carbide-tipped twist drills to drilling cast iron indicate that these tools in many cases can do the job in half the time required by conventional drills. At the same time drill life often is increased approximately four times.

The Drill—Excellent results have been obtained by one of the leading twist drill manufacturers by brazing carbide tips to the ends of regular high speed steel twist drill bodies as a regular manufacturing operation. The conventional 118 degree point angle is ground on the end of the drill at a 12 degree lip relief angle by using a 180-grit resinoid bond diamond cup wheel. It is advisable first to remove both excess steel and excess carbide with a silicon carbide wheel by grinding a 14 degree clearance angle up to a 1/32-inch wide land. Maximum drill life is obtained when cutting edges along the drill lip are kept smooth, keen and free from blemishes. Length of drill lips must be identical. To facilitate free flow of chips, drill flutes should be polished.

Such carbide-tipped drills have been produced not only by carbide tool manufacturers, but also by tool users who are equipped with the relatively simple brazing and grinding facilities required. These users purchase conventional high speed steel drills "over the counter," then tip them with carbide before putting them into service.

A silver brazing alloy such as Easy-Flo No. 3 is used as the brazing material, as with other types of tipped carbide tools.

An 8-degree right hand spiral at the drill lip increased to a 15-degree right hand spiral for the flutes through the drill body, gives desirable free movement of chips out of the hole.

Drilling Equipment—Special drill equipment, either machines or fixtures, is not required for effective use of carbide-tipped drills. Same equipment can be used as for high speed steel drills, provided that the machines are equipped with power feeds and have adequate power reserve. Speeds or feed rates simply are stepped up, thus attaining increased output as well as lengthened tool life. It is not good practice, however, to increase speeds or feeds to such a degree that the motor is overloaded, causing the spindle to slow down the cut. Clutches also should be checked. If increased motor load causes them to slip, drill life will be adversely affected.

Radial drilling machines are well suited to use of carbide-tipped twist drills on cast iron. As with high speed steel practice, precautions include keeping spindle end play to a minimum and checking alignment of drill jig bushings with indicator.

With regard to drill holders, best practice is to fit the drill directly into the spindle socket or into reducing sleeves. While quick-change holders can be used, floating holders are not recommended.

Spindle nose sockets, reducing sleeves and drill shanks should be kept free from burrs to preserve drill alignment with guide bushings and to keep drills running true. This practice is no different from that with ordinary drills.

Speeds and Feeds—In drilling cast iron with carbide-tipped twist drills, using conventional equipment, practically any speed in the range of 75 to 200 surface feet per minute gives good results.

There is no more necessity for reducing feeds when higher speeds are used with carbide drills than for steel drills. Selection of drilling speed (within the range of the equipment) simply is a matter of balancing increase in output against increase in drill life desired.

Depth-Speed Relationship — Indications are that there should be some relationship between depth of holes being drilled and drill speed used with twist drills having brazed-in carbide tips. Speeds as high as 200 surface feet per minute with 0.013 feed per revolution have been used while drilling 13/16-inch diameter holes up to 5½ inches deep from the solid, without any sign of breakdown of the braze from increased temperature developed by longer drilling periods and the greater accumulation of hot chips. For drilling holes much deeper than this, it might be advisable to use somewhat lower cutting speeds when starting a job—at least until experience has demonstrated that heat developed at higher speeds will not affect the braze.

Drill feeds between 0.008 and 0.013-inch per revolution have given good operating conditions on quite a

variety of jobs. Lighter feeds are not usually advisable. They contribute at times to erratic cutting action evidenced by objectionable vibration or "sing" which encourages breakdown.

When a carbide-tipped twist drill develops such vibration, best practice is to increase feed per revolution. Not only will this give quieter operation but will also increase the number of holes per grind. Number of potential grinds per drill also will be increased, since less material per grind has to be removed to clean up the edges of a carbide-tipped drill that is operated properly.

Generally, best practice is to increase output with carbide-tipped drills by first increasing feed rather than speed. This is particularly true if equipment, operating conditions or work material do not permit safely stepping up both speed and feed.

As a matter of fact, when operating on the harder cast irons, output can be increased more effectively, and maximum tool life assured, by retaining the same speed used for high speed steel drills but stepping up the feed per revolution.

Operating Conditions—As with ordinary drills, it is always good practice to start drilled holes on previously machined surfaces. This assures accuracy of hole location and also contributes to longer tool life.

When carbide-tipped twist drills are used in setups not employing bushed drill jigs, preliminary spot drilling is desirable.

Conventional practice of center punching followed by spot drilling is equally satisfactory with carbide-tipped drills. If the spot drill also is carbide-tipped, operator will not have to change spindle speeds. Carbide-tipped spot drills preferably should be as short as possible to insure minimum hole runout.

With carbide-tipped drills, it is highly desirable to drill holes in cast iron parts "from the solid" instead of using them to enlarge cored openings in castings. Shifting of cores in the foundry too often results in uneven stock removal. This in turn causes a decided drill runout. This condition, combined with the fact that the drill lips near the drill margin must operate on rough, scaly and sandy work surfaces, results in chipouts and excessive wear. This shortens useful life of either carbide or high speed steel drills.

Put the Drill to Work—When setting up a new job with carbide-tipped drills, it is advisable to record the number of holes drilled for a given set of speed-feed conditions over several preliminary runs to determine the trend of holes per grind. Two or three such trial runs may be necessary to determine most effective speed range. Drills never should be allowed to become excessively dull, thereby resulting in their complete failure.

Data gathered from these trial runs can then be used not only to determine optimum operating conditions but also to indicate the number of holes which can be drilled before the drill should be removed for sharpening. Best practice is to set this drill-change time at 50 to 100 holes less than the minimum "between grinds" time established through the trial runs. As with other carbide tools, carbide-tipped twist drills should be sharpened *before* they become really dull. This will insure uninterrupted continuity of production along with maximum overall tool life.

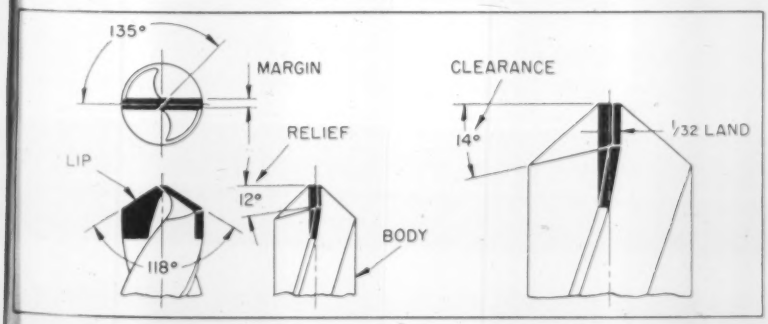
Consistency with which carbide-tipped drills operate when correctly applied, makes this practice entirely feasible. For instance, on a tough job where drills chipped after runs of 750 holes per grind, no difficulty was experienced when they were changed after each 700 holes.

Cutting Oils, Coolants—Practically all drilling of cast iron parts so far has been done dry since this practice holds the range of temperature fluctuation to a minimum, thus contributing to longer tool life. In cases where coolant must be used, soluble oil solution will be satisfactory. However, thermal shock caused by coolant hitting the hot carbide tips when the drill withdraws from a hole where it was buried in hot chips, may cut down number of holes per grind and also shorten tool life.

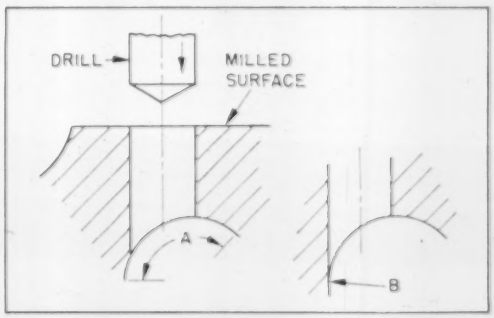
An automatic valve arrangement whereby coolant is shut off just before the drill is withdrawn, and which turns it on again just before a new hole is started, will prove helpful. Typical operation to which this applies is on machines where coolant is necessary because of other machining operations which go on simultaneously with drilling.

Drilling Materials Other Than Cast Iron—Materials such as ordinary cast brass and bronze can also be drilled with carbide-tipped twist drills at increased cutting speeds and feeds.

However, carbide-tipped twist drills have not as yet proved satisfactory for drilling steel and so are not recommended for that purpose. For such materials, modified gun drill styles such as the "all-depth" type of drill are preferable.



Dimensions and angles of carbide twist drill for drilling cast iron

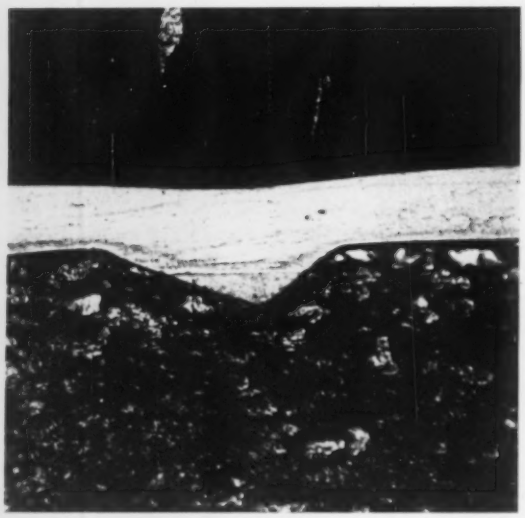


This drawing shows setup where drill entered a cast iron part on a clean surface but left the cut through a rough, scaly and sand-impregnated surface A. In some cases a slight shifting of the cored surface caused the troublesome condition shown at B, which placed excessive wear on drill lips next to the drill margins. Carbide tipped twist drill gave 750 to 1000 holes per grind in spite of the bad work condition at B

Choose the Right Nickel Plating System

Limitations on use of metal point up necessity for realizing full potentialities of nickel in applications still permitted under NPA regulations

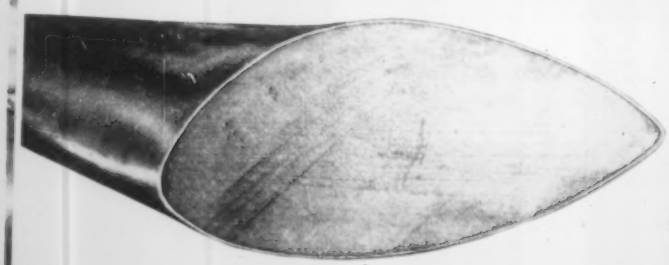
Above—Heavy shaft nickel plated to a depth of 0.200-inch to build up worn areas, before finish machining. Courtesy Plating Engineering Co., West Allis, Wis.



Above—Photomicrograph showing 0.0015-inch of Harshaw "Perflow" nickel on steel, indicating the scratch-filling or smoothing effect of the plated metal in the light area. X250

NICKEL PLATING has long found diversified industrial applications, based on its good corrosion resistant properties, favorable physical properties and ease of deposition. The wide range of properties of nickel deposits obtainable under controllable variations of plating conditions makes the metal suitable for an ever-increasing list of uses where it functions as a decorative protective finish, or in engineering applications.

Thus, soft, ductile nickel can be deposited with a good adherent bond for subsequent fabrication and corrosion protection. Brilliant, fine-grained deposits from bright nickel solutions can be employed with elimination of buffing operations on the plate. Special types of nickel plating baths have been developed which tend to minimize surface imperfections in the base metal; such deposits tend to "smooth" the surface during the plating operation. The corrosion resistant characteristics of nickel can be attained on the surface of base metals used in the construction of tanks, machinery and parts handling corrosive



Left—Section of plated wooden propeller blade. Coating of 0.010-inch of nickel prevents warpage from moisture absorption, provides abrasion resistance and increases rigidity

products to minimize maintenance costs and retain purity of the product. Worn parts, rebuilt to size with nickel deposits, have in many instances been found to possess better qualities and furnish longer operating life than the original article. Nickel can be plated on plastic and other nonconductive material to combine favorable properties.

Nickel plating processes have been developed whereby bright deposits are produced in the solution in contrast to the matte finish that is characteristic of ordinary nickel solutions. In some instances where properly designed racks are employed, the work can be transferred directly from the nickel solution to chromium tanks by the use of a suitable rinsing cycle. This procedure reduces the need for unracking and reracking between the two plating baths.

When nickel plating is used to combine the light features of plastic and impregnated wood construction with the properties of metallic surfaces, the nonconductive materials are rendered conductive by chemical reduction of a metal on the surface or by adding powdered metal or graphite to a surface lacquer. After plating, the deposit provides a metallic covering which may be soldered, polished, or used as electrical conductor, in addition to making the plastic more rigid and eliminating moisture absorption and tendency to warp. This process has been used for manufacturing a diversified list of articles, all the way from fancy buttons and umbrella handles to airplane propeller blades. Where a chromium, silver, gold or palladium finish is desired on glass, ceramics or plastics, a nickel undercoat will provide strength and resistance to wear.

Types of Plating Baths — Nickel can be deposited with a wide variety of metallographic structures and with controlled physical and mechanical properties over a wide range of values. The Watts nickel solution exhibits a flexible range of operating conditions with respect to composition, current density and temperature. The following solution below has the optimum concentrations for operation at the normal average current density of 40-60 amp./sq. ft.

Watts Bath—High pH Type

32 oz./gal. nickel sulphate
6 oz./gal. nickel chloride
4 oz./gal. boric acid
pH 4.5-6.0
Temperature 115-160° F.
Current density range 20-100 amp./sq. ft.

The original formula for the Watts bath specified concentrations of nickel chloride and boric acid of approximately half the magnitude indicated in above formula. The increase in the concentration of these two components permits the use of higher current densities, higher temperatures and improved throwing power in addition to production of a smoother deposit with improved physical properties.

The chief function of the nickel sulphate is to provide nickel ions for maintaining the metal concentration. It also increases the conductivity of the solution, simultaneously improving the throwing power. The nickel chloride provides the nickel ion and the chloride ion, the former supplementing the metal ion from the sulphate, the latter increasing anode corrosion and improving the conductivity of the solution. In addition to these benefits, it has been determined that the chloride ion increases the cathode efficiency when carried in concentrations greatly higher than those indicated in the Watts bath composition. Boric acid provides a buffer action to stabilize the pH and produces a whiter, more ductile and smoother deposit.

Watts Bath—Low pH Type

44 oz./gal. nickel sulphate
6 oz./gal. nickel chloride
5 oz./gal. boric acid
pH 1.5-4.5
Temperature 115-140° F.
Current density range 25-100 amp./sq. ft

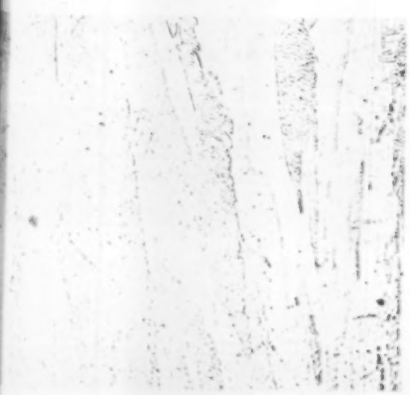
International Nickel Co. cites the following advantages of the low pH Watts solution over the high pH solution:

1. Higher current densities can be employed without danger of peeling and cracking of the deposit; this increases output per tank unit.
2. With most types of anodes, depending upon the particular combination of pH, chloride concentration, temperature and current density, improved anode efficiency is obtained and the bath is operated more economically because of the resultant decrease in nickel salt consumption.

Disadvantages of the low pH bath are:

1. Lower throwing power at low current densities.
2. Tendency toward pitting at some points in the pH range.
3. Lower cathode efficiency.

The low pH Watts solution is commonly known as



Left—Structure of soft nickel deposit from Watts bath, with Vickers hardness of 150, tensile strength 51,000 psi. X500. Right—Contrasting appearance of hard nickel deposit, with 360 Vickers hardness and tensile of 132,000 psi. X500. Courtesy International Nickel Co. Inc.

the "soft nickel" or "general purpose", because of its wide plating ranges with respect to pH current density, temperature, etc. Typical physical properties of the deposit from this solution are:

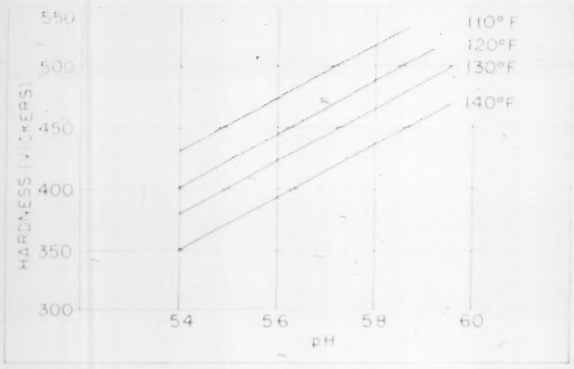
Hardness (Vickers)	140-160
Tensile strength	51,000 psi.
Elongation	30% in 2 inches.

As can be seen, this deposit is ductile and relatively soft. Steel, nickel plated from this solution, can be drawn and fabricated without rupturing and if special care is taken with die finishes, the part can be completed with little additional work. Most bright nickel plating baths are basically of the Watts type to which addition agents and brighteners have been added to produce a bright plate.

All Chloride Type Nickel Bath

40 oz./gal. nickel chloride
4 oz./gal. boric acid
pH 2.0
Temperature 140° F.
Current density range 25-100 amp./sq. ft.

Deposits from this solution are finer grained, harder, smoother, stronger and less ductile than deposits from the Watts bath. Typical physical properties that have been reported are as follows:



Relation between hardness and solution acidity in plating at four temperatures with cathode current density of 50 amp./sq ft. By International Nickel Co.

Hardness (Vickers)	230-260
Tensile strength	98,900 psi.
Elongation	21% in 2 inches.

Solution permits use of lower voltage (50 per cent saving in power consumption). Other advantages are wide plating range, reduced tendency to pit and form nodular growth and trees, and production of a smooth, tough deposit that is easy to buff. The bath operates at high cathode and anode current efficiencies and is easy to control because of the simplified composition.

The chief disadvantage of the all-chloride solution is the corrosive effect of the high chloride content. Lead cannot be used in contact with the solution; rubber lined tanks with auxiliary equipment of Karbate, hard rubber, glass or high-silicon iron are recommended.

In work reported from the International Nickel research laboratory, using a controlled flow apparatus, sound nickel deposits were actually made at the rate of 0.001-inch in 16 seconds from the chloride bath with high anode and cathode efficiencies. This is equivalent to a current density of 4260 amp./sq. ft. Such deposits proved to be less ductile than those made at normal rates but were of good protective value in porosity and atmospheric tests.

Mechanical Properties of Nickel Deposits for Engineering Uses

	Watts—Soft		Chloride		Hard
	As Plated	Annealed	As Plated	Annealed	As Plated
Tensile strength, psi	63,000	50,000	100,000	58,000	156,000
Elongation, % in 1"	31	50	21	48	6
Vickers Hardness Number	137	63	240	81	400
Rockwell Hardness Number	75(B)	17(B)	99(B) 29(C)	36(B)	42(C)

This high current density work indicated that the maximum rate at which nickel might be plated in commercial practice, using the chloride bath, assuming a solution flow rate or cathode motion at a speed of 1000 fpm., would not be limited by electrochemical factors but by such details as voltage needed, overheating of contacts, keeping anode to cathode spacing small and uniform, and provision of a uniform adequate flow rate or cathode motion.

Chloride-Sulphate Type Bath

26 oz./gal. nickel sulphate
23 oz./gal. nickel chloride
5.3 oz./gal. boric acid
pH 1.5
Temperature 115° F.
Current density range 100 amp./sq. ft.

Tests have shown that a high concentration of nickel chloride, to produce approximately a 50-50 nickel chloride and nickel sulphate solution, will produce a deposit with modified characteristics of the Watts solution and the all-chloride solution. The increased chloride concentration produces a smoother, finer grained, easier buffed deposit with less tendency to pit than the Watts solution. In addition to these advantages, the chloride-sulphate solution can be operated at lower tank voltages and higher current densities at greater cathode efficiency. The advantages over the all-chloride solution, are said to be a more ductile deposit, easier pH control, simpler purification procedure, and compatibility with certain organic brighteners. As with the all-chloride solution, lead may not be used for heating coils or piping because of the high chloride concentration. Karbate heaters and rubber lined tanks are satisfactory.

Hard Nickel Plating Bath — The development of nickel plating solutions which produce deposits with hardnesses comparable to the softer chromium deposits, has resulted in increased use of nickel plating for salvage purposes by building up worn or overmachined parts. Nickel is more adaptable to conventional machining practices than chromium and is generally more corrosion resistant. In addition to these advantages, nickel is deposited at a faster rate with better distribution over an irregular object. Hard nickel deposits find their principal uses when a deposit is needed which is tougher and less liable to crack and peel than is chromium, yet where the extreme hardness of chromium is not essential. Following is a bath recommended by International Nickel for hard nickel plating: (*Please turn to Page* 117)

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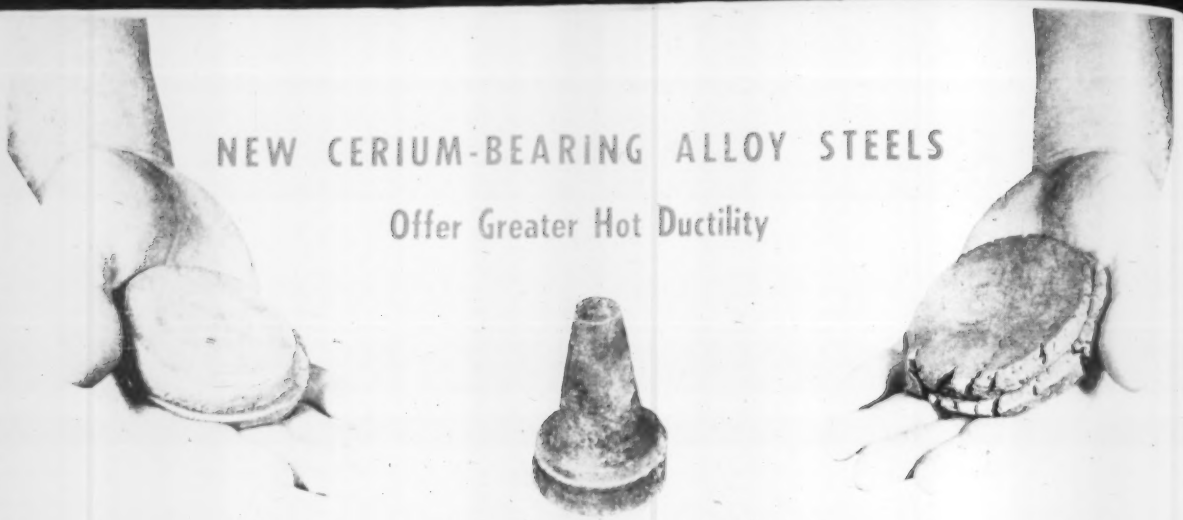


By use of these materials, forgers will get the benefits of better hot working, fewer cracks and tears, as well as better finishes requiring less machine clean-up. Fabricators should ultimately find a greater supply of strategic steels because of higher mill yields

Test for hot forgeability consists of casting a cone of the metal to be tested. It is then heated to selected forging temperature and upset or hammered into a flat "pancake" as shown. Measure of forgeability is visual. Test can be used to determine both the optimum amount of cerium to be used in a particular grade of steel and best range of forging temperatures. The two finished tests are of the same analysis . . . except that the one on the left, relatively free of cracks and tears, contains cerium

ADDITION of cerium to certain hard-to-get, high-alloy, heat and corrosion resistant materials has been found to yield alloys which can be readily hot worked. Research laboratories of Carpenter Steel Co., Reading, Pa., have been studying the technique and perfecting the proper combinations which, it is claimed, show possibilities of increasing mill yields from ingot to hot-rolled bars, plates, tubes and forgings in high-alloy steels. Their discoveries have been patented and are being made available to all steel producers through licensing agreements.

Rare Earth Element — Cerium-bearing monazite sands are found in Florida, Idaho, India and Brazil. Commonest commercial form of the metal is in combination with its sister element, lanthanum, in misch metal which is an alloy of rare earth metals containing about 50 per cent cerium with 50 per cent lanthanum, neodymium and similar elements.

One use of the alloy is as an inoculant in cast iron to produce the high-strength nodular irons. Addition of cerium to so-called superalloys such as Durimet 20 yielded a workable stainless steel, giving excellent resistance to sulphuric acid and now marketed as Carpenter No. 20. The same applied to the company's 21-12N valve steel which was difficult to hot work in the quantities demanded until cerium additions were made.

At least seven years in the development stage, Carpenter's finalized cerium-addition procedure applies to ferrous alloys containing nickel and one or more of the elements chromium, molybdenum, cobalt, copper, tungsten, silicon, manganese, columbium and vanadium. Nickel content of any of these alloys determines the minimum and maximum allowable ranges of cerium and lanthanum which will give the desired hot workability; as it increases, the cerium-lanthanum range narrows.

Corrosion and heat resistant steels supplied by Carpenter Steel in the new cerium-bearing alloy range and patented as such, include stainless AISI types 309, 310, 316, 317 and 330, as well as the company's stainless No. 20 and austenitic valve steels.

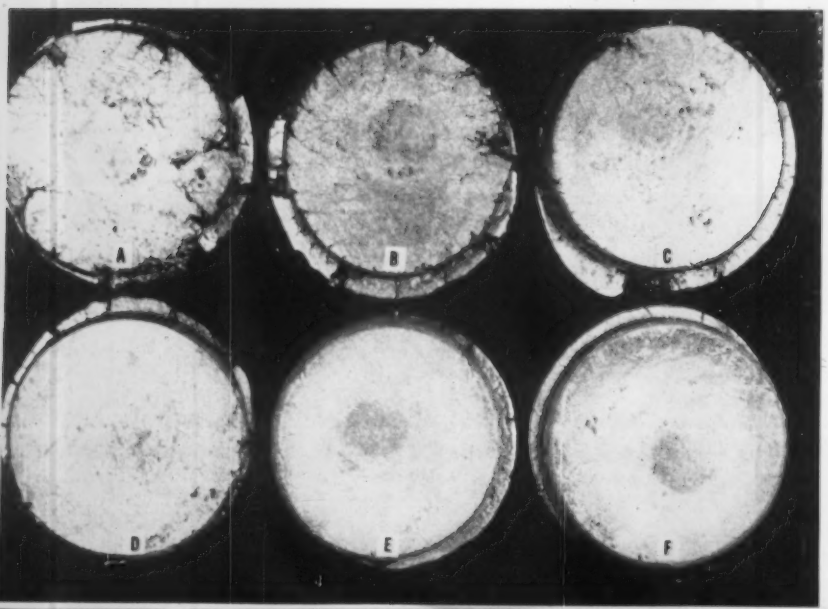
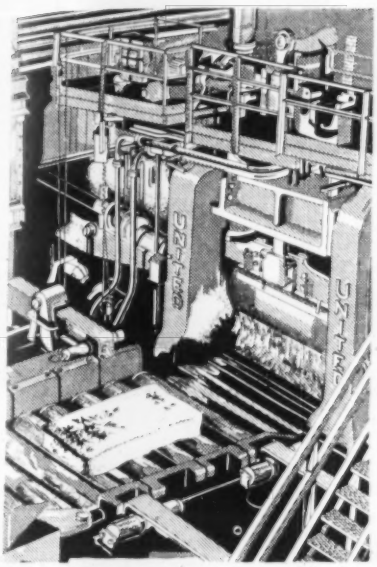


Illustration of the critical amount of misch metal to be used to produce best hot forgeability in Carpenter stainless No. 20, a sulphuric acid resisting steel having the following percentage analysis: Carbon, 0.07; silicon, 1.00; chromium, 20.00; molybdenum, 2.00; nickel, 29.00; and copper, 3.00 min. Pounds of misch metal per 1000 pounds of metal used for the designated samples was: A-0, B-1, C-2, D-4, E-6, and F-12



Technical Advances Revealed at AISE Meeting

UNPRECEDENTED, record-shattering expansion now planned for the American iron and steel industry is proceeding at a rate deemed impossible only a short time ago. New and ingenious ideas for equipment, better production techniques and improved maintenance practices developed at individual plants are reflected in the industry's greater capacity for production." So stated John F. Black, president of the Association of Iron and Steel Engineers, in calling together his membership for the annual spring conference sponsored by the society's Rolling Mill Committee at Hotel Statler, Detroit, recently.

Many new developments were covered during the technical sessions, some of which are abstracted as follows:

Descaling of Carbon Steel

C. S. Lambert, superintendent of merchant mills, Youngstown Sheet & Tube Co., Youngstown.

Today's merchant mill operator must be acutely aware of an increasing demand for quality and be cognizant of methods by which many defects can be removed from the product or in a large measure prevented. Efficient scale removal is of primary importance. This is the origin of many quality problems in the rolling of rounds, flats and hexagons.

There are two types of scale—primary and secondary. Each type has inherent and distinct characteristics requiring individual consideration. Primary scale, that which is initially formed on the billet in the reheating furnace, will generally have the most detrimental effect on the product and must be removed prior to entry into the roughing mill. Secondary scale is formed during rolling where the bar is exposed to the atmosphere for a short period of time between stands. Like primary scale, it must be removed in order to produce a bar of good quality.

If primary scale is allowed to adhere to the bar and rolled in by the roughing train, it may fall out in spots in succeeding passes, leaving a depression in the finished bar. Furthermore, rolled in primary scale which does not fall out during the rolling process will often be revealed as scale pits after pickling, prior to cold drawing. Peculiar characteristic of secondary or thin scale is evidenced by scale mottle and pits on the finished bar which normally cannot be removed by pickling. Such bars are therefore not applicable to the end product when a bright finish is required. Both types of scale, if not removed, will follow the product through the mill and possibly adhere to the rolls or guides causing shearing and tearing of the bar.

For many years merchant mill operators have experimented with numerous mechanical devices for removing scale, such as scrapers, hold downs and wire brushes. These were followed by the application of steam, compressed air, and high pressure water. Of all these methods, high pressure water has proved to be the most economical and efficient means of descaling carbon steel in the rolling of merchant bars. However, a hydraulic descaling installation will not guarantee good surface quality unless it is correctly arranged and effectively used. Indiscrimate use of high pressure water may result in more adverse effects than benefits. Various mills use high pressure water for scale removal with pressures ranging from 350 to 1300 psi. Pressure selections are influenced by type of mill, section size and, in some cases, available equipment.

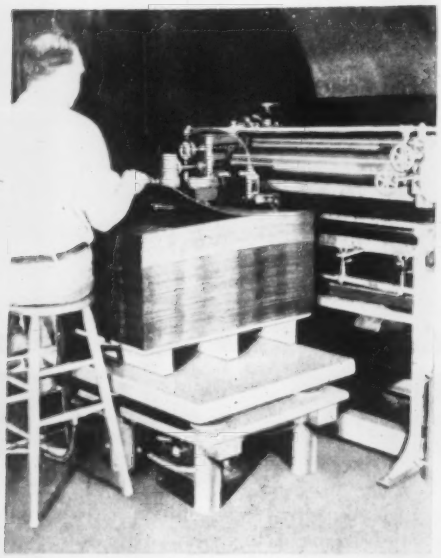
One important factor which cannot be overlooked in high pressure descaling is the danger of excessive cooling of the bar by an over abundant use of water. The quantity of water should be determined by a careful analysis of the section size at the point of descaling.

There is no doubt hydraulic descaling has become a must for rolling quality merchant mill products. Not only does it insure a bar free of rolled in scale, but it also substantially increases roll and pass life. In addition, delays due to changing or grinding guides have been reduced, with a corresponding reduction in guide shearing and tearing.

Precast Insulation for Water-Cooled Supports

James E. Hovis, Bloom Engineering Co. Inc., Pittsburgh.

Heat loss to water-cooled support pipes in underfired furnaces, coupled with the effect of these cold surfaces located in close proximity to hot steel, gives rise to several serious problems. Specifically, these problems include: Loss in efficiency and production, nonuniform heating, slagging and sticking, and considerably cooler sections which ride the skids due to the effect of the cold skid pipes that are in close



Previous to installation of the automatic, self-leveling **Portelvator Packlifter,** the sheet feeding operation shown here was performed from a standard four-wheel floor truck. This involved stooping and lifting, and resulted in unused machine capacity. Application of **Portelvator** Material Positioning Equipment increased daily production to such extent that installations were made at 6 additional locations.

YOUR PROSPECT FOR COST REDUCTION IS

Excellent

Time after time after time, the application of **Portelvator** to material positioning at the machine has resulted in such savings that problems, which seemed to have only a remote relationship to the operation, have vanished. If you have one machining operation where mechanical material positioning can be applied, your prospect for cost reduction is excellent.

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Portelvator is the registered name for the Handy Hamilton Portable Elevating Table. Standard models have lift capacities of 1,000 — 2,000 or 5,000 pounds, and lift travels to 58" above floor level. Lift is transmitted through worm, worm gear, and screw. Lift principle removes all possibility of tipping, slipping or settling under the load.

Modified designs, with various power applications and controls, are used throughout industry for lifting and leveling safely and "as planned"

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relationship to hot steel.

An 80 per cent reduction in heat loss can be effected by the application of insulation to the water cooled skid and support pipes, and an overall fuel saving of 20 per cent can be realized.

A precast half-section of insulation is formed by embedding heat-resistant alloy wire mesh into a high-temperature castable refractory. The alloy wire performs two important functions—it gives strength and rigidity to the refractory and it provides a simple, dependable means of fastening the precast section to the pipe. The ends of the wire extend beyond the refractory so that they are readily tack-welded in place. Temperature of the alloy wire in the furnace at 2600° F is 1825° F, which is well below the allowable temperature. Advantages inherent in the use of insulation can only be fully realized if such insulation is properly maintained. Required repairs can be carried on simultaneously with other maintenance work during normal shutdown periods.

Clad Metal Properties Are Tailor Made

Walter L. Keene, director of research, Superior Steel Corp., Carnegie, Pa.

One of the most favorable characteristics of clad metals is that, when properly made, the layers cannot be physically separated. When compatible metals are properly bonded together, and, of course, are inherently ductile, they can be drawn, rolled, spun, bent, twisted, heated and quenched, upset, punched or otherwise formed as though they were a solid metal providing, that proper precautions have been taken to insure ductility at the bond line.

Regarding the latter point, certain elements, commonly found in the components of clad metals, will interact with each other at elevated temperatures, provided the time factor is present, to form brittle compounds. An excellent example of these interacting elements is carbon and chromium. When chromium containing alloys, as the straight chrome stainless types, are bonded to steel chromium appears to draw the carbon and the steel across the interface and concentrate it adjacent to the interface in the chromium containing component, forming a high carbon-chromium alloy that, after ordinary annealing treatments, is hard and brittle. Unless this action is prevented, such clad metals cannot be formed without the chromium-con-

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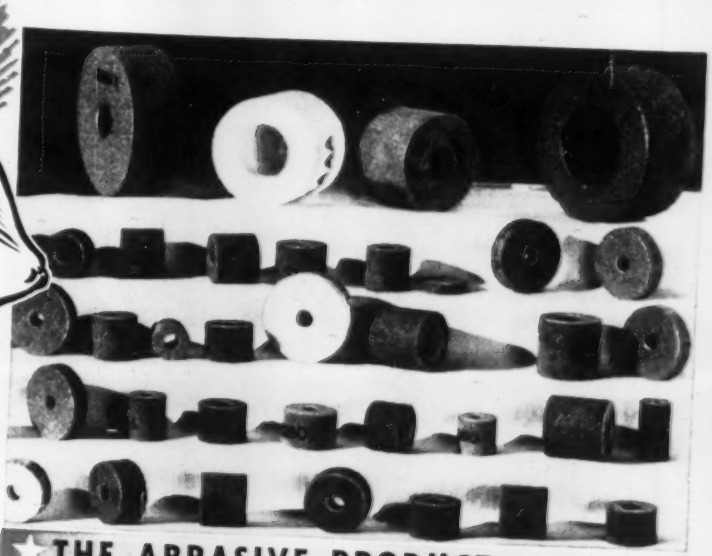

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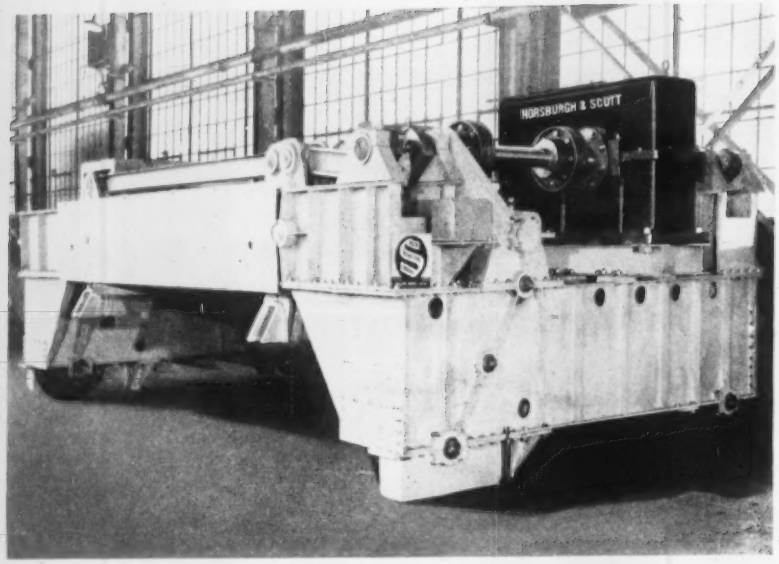
In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario

★ KEEP AMERICA STRONG ★

Giving a lift to 56,000 pounds of



soaking pit cover through . . .

H&S REDUCERS

● The above photograph shows a soaking pit cover crane designed and built by Salem Engineering Company. Two Horsburgh & Scott Helical Speed Reducers are used on each crane...the lift drive handles a cover weighing about 28 tons and operates at a speed of 6′ per minute... the traverse drive moves the crane at a speed of 88′ per minute. Many of these cranes have been operating very satisfactorily for twelve to fifteen years... actual tribute to complete engineering design.

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVE. • CLEVELAND 14, OHIO, U.S.A.

Send note on Company Letterhead for Speed Reducer Catalog 46

taining layer flaking off in ttle fashion.

Properties of clad metals ca al- most be tailor-made. They can be de- signed for specific corrosion esis- tance with great strength, s cific corrosion resistance with exc lent thermal conductivity; oxidation esis- tance; bearing properties with high strength; damping characteri tics; shock resistance; and other des able properties. By cladding, adva tage can be taken of only the better proper- ties of the several different m tals. Surface of clad metals is solid, non- porous and homogeneous, having all the characteristics of the solid metal of which it is composed. The core metal is likewise in its best condition for the service intended; that is, an- nealed or heat treated.

More than twenty different meth- ods of cladding have been developed. Some of these have been brought to commercial status and are used to produce considerable tonnages, some have gone no farther than the idea stage. In general, there are five sys- tems in use today: Pressing, casting, direct rolling, sintering and deposi- tion. There are many variations in each class, many modifications, and many improvements to basic ideas. Some are even on the borderline, but if a rolling step is included in the manufacturing operations, they are included as clad metals.

Ingot Track Time Affects Soaking Pit Heating

J. R. Chegwiddin, superintendent of mills, Saucon Division, Bethlehem Steel Co., Bethlehem, Pa.

As good track time is vital to the economic life of a soaking pit operation, an analysis, in time and temperature, must be made of each operation included in its measure- ment. These operations, in order of their influence to track time, are de- scribed as follows: 1. Open hearth tap to teem or hold time (time of tap being taken when ladle is full of steel), 2. teeming and solidification, 3. stripping, 4. transportation or in- got exposure to the atmosphere. Transportation holds the key to good track time. Co-ordination and co- operation between the railroad and operating personnel, through the me- dium of good communication for the interchange of information, is neces- sary to obtain efficient transporta- tion.

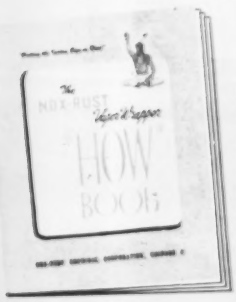
A more accurate means of evaluat- ing heat content is offered through the use of the optical pyrometer at the soaking pits. Both soaking pit economy and capacity are dependent upon track time or ingot heat con-

SEE NOX-RUST FOR YOUR RUST PREVENTIVES...

To fight the battle against rust, Uncle Sam has drafted rigid requirements for rust preventives that are used in packaging metal parts and products. To find the proper product conforming with these Federal Specifications, call on NOX-RUST . . . the world's largest manufacturers of rust preventive products. NOX-RUST has the answer for you . . . all prepared in a handy chart that shows Federal Specifications, uses, applications and specific product recommendations. For your free copy of this chart, just use the handy coupon below.

NEED A RUST PREVENTIVE TAILORED TO YOUR NEED?

Just call NOX-RUST. Chances are an existing product can fill the bill for you. Or, NOX-RUST can build a product around your problem, as they already have done for many major corporations. For complete information, call or write NOX-RUST today.



STOP RUST WITHOUT OIL OR GREASE

Here's a NEW way to package parts and machines without oil or grease coatings. NOX-RUST's new Vapor-Wrapper delivers your parts "factory fresh"—sparkling clean—ready for immediate assembly or use. Send for the "HOW" book that shows case histories of how others have eliminated slushing and de-greasing problems with Vapor-Wrapper. It's yours FREE . . . from NOX-RUST—Headquarters for all Rust Preventive Products.

Nox-Rust Chemical Corporation
2451 S. Halsted St., Chicago 8, Ill.

Please send information on (check one or both)

☐ Rust Preventive Chart ☐ Vapor-Wrapper "How" Book

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COMPANY NAME _____

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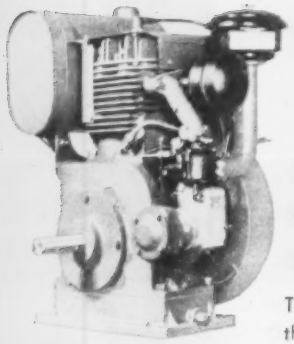


Four Single-Cylinder WISCONSIN *Air-Cooled* ENGINES Offering More POWER ADVANTAGE, 6 to 9 hp.

This series of single-cylinder models have all of the traditional Wisconsin heavy-duty features such as self-cleaning tapered roller bearings at both ends of the crankshaft, rotary-type, high tension OUTSIDE magneto operating as an independent unit, and maximum torque at all usable speeds.

CONDENSED SPECIFICATIONS

MODELS	AEH	AFH	AGH	AHH
Bore - - - - - - - - - inches	3	3¼	3½	3⅝
Stroke - - - - - - - - - inches	3¼	4	4	4
Disp. cubic inches - - - - - - - -	23	33.2	38.5	41.3
H. P. and R.P.M. range - - - - - - -	3.9 at	6.0 at	7.2 at	7.7 at
	1600	1600	1600	1600
	6.1 at	7.2 at	8.4 at	9.2 at
	2600	2200	2200	2200
Net weight in lbs., Standard Engine - - -	130	180	180	180

Our engineering department will gladly cooperate with you in adapting Wisconsin Engines to your requirements. Write for detailed data and name of the nearest Wisconsin distributor.

WISCONSIN MOTOR CORPORATION

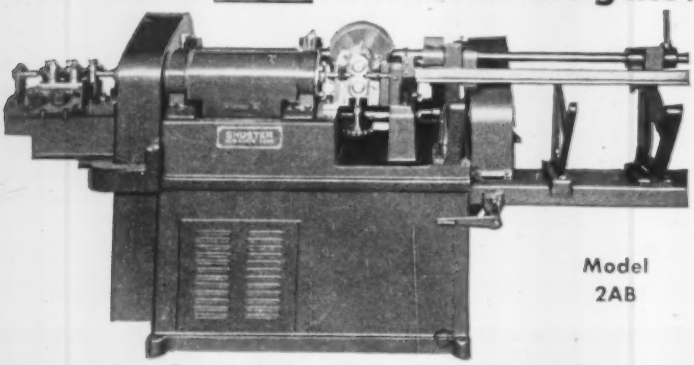
World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 46, WISCONSIN

This New, Economical

SHUSTER

Cut Costs AND Accurate Lengths!



Model 2AB

Capacity: $\frac{1}{16}$" dia.—$\frac{5}{16}$" dia. (BASIC WIRE)

Automatic

WIRE STRAIGHTENING AND CUTTING MACHINE

This new "SHUSTER"—with its five gear-design straightening rolls—handles even badly twisted wire with ease. Square and rectangular as well as round wire may be straightened and cut to exact lengths. Other "Shuster" features that assure high speed, quality production are: almost continuous wire travel, rapid cut-off, V-belt motor drive, ball and roller bearings, and extreme rigidity throughout. Write for details.

Mfd. by METTLER MACHINE TOOL, INC.

132R Lawrence St. New Haven, Conn.

Representatives in all principal cities and foreign countries.

tent as received at the soaking pit.

To evaluate effect of track time to a soaking pit operation, analyses of the various types of steel, molds and ingot sizes used in the flow of steel to the soaking pits, would be necessary.

Emergency Drive for Blooming Mill Auxiliaries

F. C. Fennell, steel mill engineer, industry engineering department, Westinghouse Electric Corp., E. Pittsburgh, Pa.

Due to its importance as the initial operation in the steel plant, considerable emphasis is today placed on insuring continued blooming mill operation to prevent any interruption of the flow of steel to the rolling mills and processing lines which follow. Although the probability of failure of electrical equipment is no greater in the blooming mill than in other steel plant operations, any loss of time due to an outage is much more severe since the cost per hour of downtime is usually greater. In both main and auxiliary electric drives the problem of keeping the blooming mill in operation in spite of equipment failure received much attention both from the electrical manufacturer and the steel plant operator.

Majority of emergecy arrangement installations fall into several main categories including: 1. Emergency operation from one of the drive generators; 2. provision of a stand-by generator and controller; and 3. duplication of generators.

One of the main advantages of the standby generator system—which is perhaps the most obvious means of providing some form of emergency operation—is that for an outage on one generator the mill can operate just as though no failure had occurred. Usually mill electricians adjust the voltage of each generator to suit the maximum operating speed desired on each drive by the operating crew. Since each drive may therefore have a different type voltage it becomes apparent that the stand-by generator must be recalibrated not only for each generator rating it replaces, but also for the particular operating condition of each drive. For simplicity it is desirable that this latter recalibration to suit the operating condition be done manually by the electrician each time the stand-by unit is put into service. To arrange for automatic recalibration causes considerable complication in the control transfer circuits.

There is an almost unlimited variety of emergency transfer arrangements which can be developed al-

though most tend to be modifications or combinations of the three basic arrangements. It is becoming more and more common to provide variable voltage drives for the manipulator finger lifts on blooming mills. Where this type of drive is used, the opportunity exists for using the finger generator as the emergency unit.

Rolling Characteristics of Various Steels

Edgar M. D. Herold, superintendent of finishing mills, Crucible Steel Co. of America, Midland, Pa.

This speaker raised the question "Do alloying elements such as carbon, manganese, silicon, nickel, chromium, molybdenum, vanadium, tugsten, and cobalt impart their properties to steel at rolling temperatures?" He stated that in his opinion they are not as powerful in their effect, or rather the properties they impart to steel at rolling temperatures as they are at room temperature. Furthermore, the properties they do impart are not consistent through the temperature range from 2000 to 1600° F. Above the transformation point we might normally expect the alloys to begin showing their properties in a straight line curve from 2000 to 1600° F, and perhaps lower, but it is not felt that this is the case.

Handling and Storage of Electrical Parts

A. W. McAuly, superintendent, electrical department, Edgewater Steel Co., Oakmont, Pa.

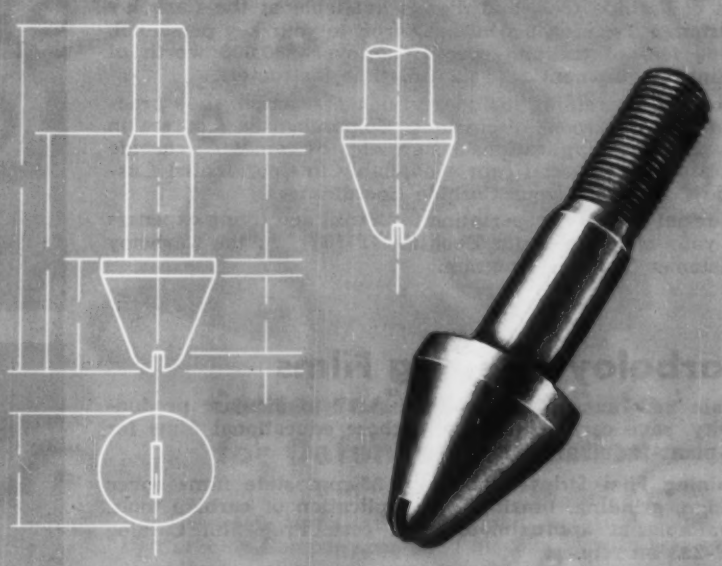
Primary purpose of electrical maintenance crews of any industrial plant is to see to it that production machinery does not fail in service any oftener, or for periods longer, than can by any reasonable means be reduced. In this effort, a large factor is the provision of spare units, which may be quickly installed to replace a defective part, thus restoring a machine to service much sooner than would be the case if repairs were made on the job. Another factor fully as important is the development of methods calculated to reduce this replacement time to a minimum, consistent with safety. It follows that the electrical department of a steel mill is bound to accumulate large numbers of various items and spare parts for the equipment under supervision.

These parts range all the way from complete motors and controllers of various sizes, to the smallest instrument parts. They also include castings and forgings of various shapes

A Ⓑ IN THE "BONNET"

. . . or maybe you call it a hood

Under the hood of your car you'll find this unusual looking Ⓑ special. It does a better job of latching your car-hood than other fastening devices. Simplified design through specialized fastening is today's trend.



THIS Ⓑ HOOD LATCH BOLT DOES THE JOB

SPECIFICATIONS

Steel, 1015, finish cadmium or zinc plate. Heads to be concentric with barrel to within .015. P.D. of thread to be .4639 —.4675, after plating. Dimensions to suit your most exacting requirements. Quality — Ⓑ.

Designers who use Ⓑ specials are often able to reduce the parts of an assembly; effect production economies; and give the buyer a better product. That is progress. For this reason the Buffalo Bolt Company maintains a staff for cooperation with customers on special fastener problems.

THE BEST...*from Billet to Bolt*

BUFFALO BOLT COMPANY

Division of Buffalo-Eclipse Corporation

NORTH TONAWANDA, NEW YORK

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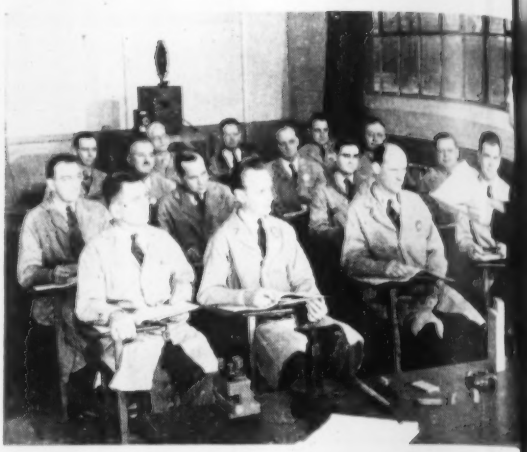
Our Specialty is **"SOMETHING SPECIAL"**

GET THESE EXCLUSIVE CA
to increase productivity... co

Carboloy Training School

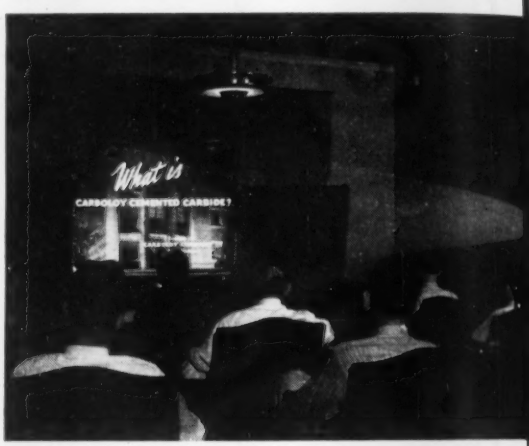


Specialized basic and advanced training in getting the most out of carbide tools and dies is available at the Carboloy Customer Training School in Detroit to your key personnel. 3,000 feet of training space . . . over $80,000 worth of training equipment . . . six full-time instructors.

Program of training includes visual instruction, shop practice and classroom discussions. Comprehensive courses in all phases of application, design, etc., of cemented carbide tools or dies; special course available in Coordinated Carbide Control for your Carbide Coordinator.

Your only cost: transportation to Detroit and living expenses of your men. Write for Booklet GT-197 . . . the Carboloy Customer Training Program.

Carboloy Training Films



Train new men, refresh "old-timers" to increase productivity, save carbide tools with these educational films for in-plant training:

Training Film Strips—Six silent 35-mm slide films cover design, grinding, brazing and application of carbide tools. Available at approximate print cost. Free film Catalog GT-223 on request.

"Everyday Miracles"—a nontechnical, 24-minute, 16-mm sound film on the development and use of cemented carbides. Available on loan as a free Carboloy service.

Carboloy Company can also assist you in obtaining U. S. Office of Education 16-mm sound motion pictures. These films explain techniques of brazing, grinding, and application of carbide tools. Descriptive circular from Carboloy Company on request.

Carboloy Plan of Coordinated Carbide Control

A practical system proved in hundreds of plants for increasing production and conserving tools through properly coordinating all phases of carbide tool design, use and maintenance.

"Triple C" Manual sections — available to supervisory personnel—explain in detail the procedure of this proved plan. Sections include:

1. The "Triple C" Organization
2. Starting and Maintaining the Program
3. Training Carbide Personnel
4. Methods and Planning
5. Establishing Tool Standards
6. Application and Trouble-Shooting
7. Tool Handling, Inventory Control and Requisitioning
8. Centralized Grinding, Fabrication and Inspection
9. Records and Reports
10. Case Histories

Write for free descriptive Booklet GT-216-A.

ECARBOLOY SERVICES
.conserve carbide tools

Carboloy Technical Literature

Tool Manual Sections — presented in step-by-step technique; these informative sections include:

1. Designing Single-Point Tools
2. Chip Breaker Design
3. Grade Selection and Recommended Speeds
4. Brazing Carboloy Tools
5. Grinding Single-Point Tools
6. Grinding Chip Breakers
7. Applying Carboloy Tools
8. Trouble-Shooting
9. Tool Control and Method Selection
10. Inspection

Single copies of sections free; quantities at 10c each. Sections combined in one Manual GT-191 for supervisory use. Individual copies free; quantities at 50c each.

General Tool Catalog—GT-250—complete information on Carboloy Tools and Blanks and how they can help you get maximum productivity. Free on request.

Die Engineering Manual D-124—latest technical information on application, design, fabrication and maintenance of sheet-metal dies. Your copy sent free on request.

Grade and Speed Selector—easy-to-use calculator shows recommended speeds for cutting and recommended grade of Carboloy cemented carbide for any material to be cut. Ask for chart GT-218; price—50c.

Do's and Don't's Card GT-211—post these *free* cards near machines as constant reminder to operators of correct carbide usage.

Cemented Carbide Data for Defense Production

(Part 1: Shell Machining)

New complete technical and training literature, compiled by Carboloy Company, on shell machining with cemented carbides for maximum productivity and conservation.

Packed with valuable information on tool design applications for machining 90-, 105-, 120- and 155-mm shells. Available only to executives of companies with shell machining contracts. Specify size of shell when requesting.

ACT NOW!

Your local Carboloy Sales Engineer or Authorized Distributor will gladly arrange for you to use any of these services in your plant. Or . . . write, wire or phone Carboloy Company direct.

CARBOLOY COMPANY, INC.

A General Electric Affiliate

11141 E. 8 Mile Ave., Detroit 32, Michigan

"Carboloy" is the trade-mark for the products of Carboloy Company, Inc.

CARBOLOY®

CEMENTED CARBIDE

"Standard"

Serves Manufacturers Who Use All Shapes and Sizes of

MECHANICAL STEEL TUBING

SIZE AND THICKNESS CHART

of Electric Weld Tubing for Mechanical Use

TUBE DIAMETER "O.D. SIZE	MAXIMUM WALL		MINIMUM WALL	
	DECIMAL	B. W. GAUGE	DECIMAL	B. W. GAUGE
1/2"	.065"	16	.028"	22
5/8"	.065"	16	.028"	22
3/4"	.065"	16	.028"	22
7/8"	.083"	14	.028"	22
1"	.109"	12	.028"	22
1 1/8"	.109"	12	.028"	22
1 1/4"	.134"	10	.028"	22
1 3/8"	.134"	10	.028"	22
1 1/2"	.148"	9	.035"	22
1 5/8"	.148"	9	.035"	20
1 3/4"	.148"	9	.035"	20
1 7/8"	.165"	8	.035"	20
2"	.165"	8	.035"	20
2 1/4"	.180"	7	.035"	20
2 1/2"	.203"	6	.035"	20
2 3/4"	.203"	6	.035"	20
3"	.220"	5	.049"	18
3 1/4"	.220"	5	.049"	18
3 1/2"	.238"	4	.049"	18
3 3/4"	.238"	4	.049"	18
4"	.238"	4	.049"	18
4 1/4"	.238"	4	.049"	18
4 1/2"	.250"	4	.049"	18
4 3/4"	.250"	3	.065"	16
5"	.250"	3	.083"	14
5 1/2"	.180"	7	.083"	14
6"	.180"	7	.083"	14

*Intermediate sizes within the range indicated can also be manufactured. Please consult us for sizes not listed.

Manufacturers requiring tubing for civilian or defense production prefer "Standard's" Electric Weld Steel Tubing for many reasons! "Standard's" Electric Weld is produced in one of the most versatile and complete mills of its kind in the world. "Standard's" 33 years of specialized tubing "know-how", and monthly production of millions of feet of stainless and carbon steel tubing, in wide range of sizes and gauges, assure you of utmost satisfaction. No problem of tolerance, precision or severest application for mechanical, structural, or pressure tubing is too difficult.

STAINLESS STEEL TUBING
⅛" to 3" O.D. . . . .028 to .095 wall

ABOVE CHART COVERS ROUND CARBON STEEL TUBING . . .

•

EQUIVALENT SQUARES, RECTANGULARS AND SPECIAL SHAPES ARE ALSO AVAILABLE.

and sizes for electric crane and charger repairs. Sometimes electrical departments maintain such items as pinions and gears, belt drives, chain drives, mechanical couplings, complete blowers, fans, and gear reducers. In order to reduce delays caused by breakdown of production machinery, replacement parts such as armatures, bearings, resistors, motor and control parts, cables, trolley wires, collector slides, brushes, etc. must be instantly available in a wide variety of sizes.

General principles must be adopted: First, all parts must be in plain sight —instantly available without disturbing any other part. Second, suitable handling facilities for the heavy parts must be provided both for lifting and transporting material that is too heavy to carry. Third, material should be classified and stored in a particular location. Fourth, storage space should not be used as work space, or vice versa.

Locomotive Torque Converter

Outstanding feature of the hydraulic torque converter on Plymouth industrial locomotives used lies in the provision of an infinite number of ratios of speed and power including zero. This results in the application of the most effective ratio, at any given instant, for existing conditions of input torque and load. The main advantage is a heretofore unknown smoothness of drive which reduces vibration and shock loads from the engine. In addition, this smooth transmission of power plus the converter's shock-absorbing feature greatly reduces wear on moving parts.

The converter is mounted directly to the engine flywheel housing and connected to the transmission by means of a flexible coupling. Output is controlled by the throttle lever which controls engine speed. Closing the throttle until a resistance point is met slows the engine to idling speed, and output remains at zero.

The reversing mechanism is, in most cases, air operated and interlocked with the throttle lever making it impossible to reverse the locomotive unless the engine is idling.

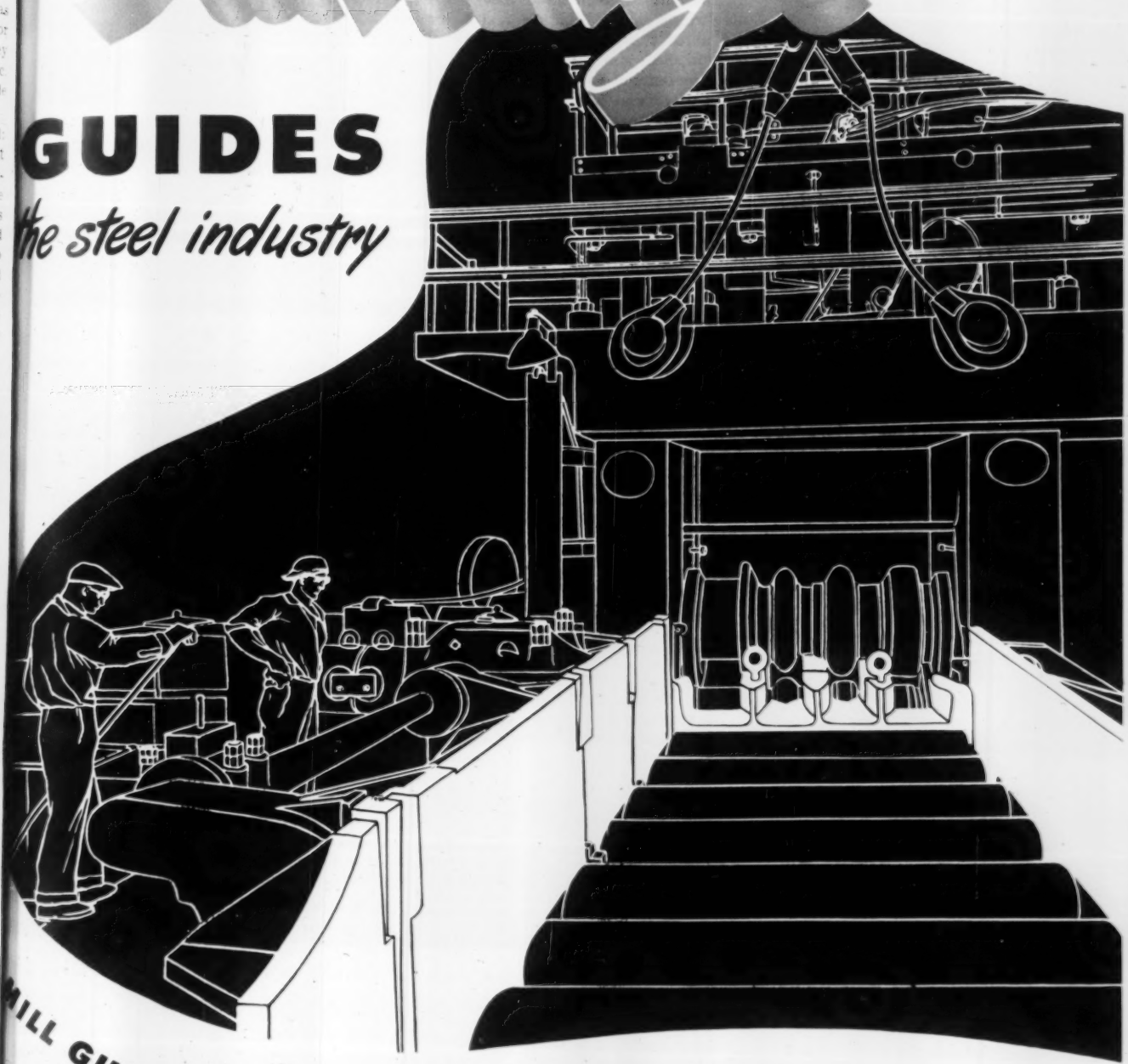
To assure that the locomotive remains at a "stand" position, a disconnect clutch or retarding brake is used. If the disconnect clutch is used, the clutch is never used to start the load; loads are always started by the slipping characteristics of the torque converter.

Literature describing performance features and construction of the converter is available from Plymouth Locomotive Works, Division of The Fate-Root-Heath Co., Plymouth, O.

Tantiyl

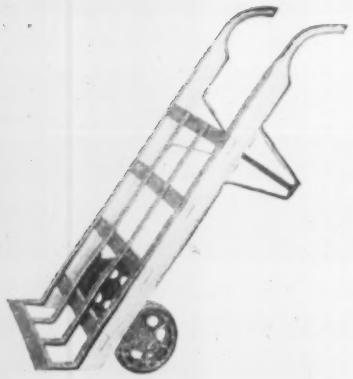
GUIDES

the steel industry

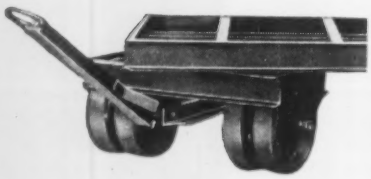


ILL GUIDES and OTHER VITAL WEAR-RESISTANT TOOLS

Youngstown Alloy Casting Corp.
Youngstown, Ohio



Trucks and Trailers



up to 50 ton capacity

Built with 80 years of skill by pioneers in the industry. Over a hundred standard two, four, and fifth wheel trucks and trailers. Special units designed and built to your specification. Complete engineering service.

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Firm_____

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THE KILBOURNE & JACOBS MFG. CO.

792 Congress St., Columbus 16, O.

Metal Spinning

(*Concluded from Page 91*)

1. Shearing and circling, 2. breakdown spinning operation on a standard breakdown block, 3. spindown operation on a special spindown chuck, 4. "necking-in" operation on a split or segmented block, 5. edge trimming and beading, and 6. removal of the collapsible block from the finished spun part's interior. Block segments are numbered 1 to 5 inclusive and built up and removed in their natural order.

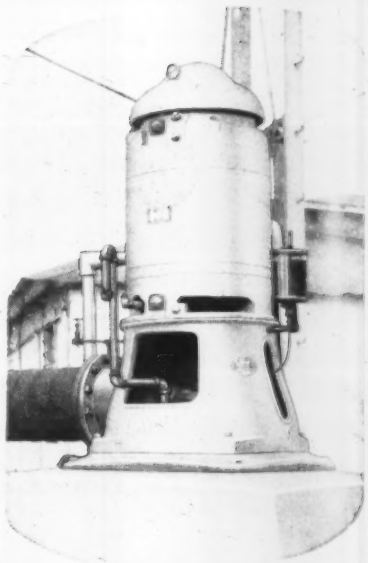
Intermediate cleaning and annealing is performed between operations two and three and three and four noted above. Cleaning is handled in a Detrex single-stage emulsifier-type unit at 180° F. Annealing is done at 1850° F followed by an air quench. The part is pickled at 180° F prior to its beading operation in a mixture of sulphuric and nitric acid of approximately 90 and 10 per cent concentration, respectively. Final cleaning and degreasing is followed by polishing the part's outside surface with 100 to 240 grit by use of a rotating motion on a lathe similar to a spinning lathe. This renders a bright, smooth surface.

Spincraft has pioneered in the hot spinning technique used for heavy gage work in many metals, especially magnesium. An oxyacetylene flame imparts a degree of ductility to the metal which is wholly lacking when it is in the "cold" state. The flame plays on one side of the revolving spinning while the work tool is operated on the other side.

Spinning is also applicable to metals other than those whose surface is solid and unbroken. Special techniques today make it practical and economical to spin shapes of perforated and expanded metal. The holes or mesh are elongated according to the material's contour changes. However, these distortions are usually without any significance to the product's end use. An outstanding example is a parabolic antenna which was recently spun from a blank of two welded half-circles of flattened, expanded metal 102 inches in diameter..

Subcontract Facilities Listed

Complete equipment for production stamping, metal fabricating and finishing for defense and civilian subcontract work is described in a 12-page facilities report released by Globe Stamping Division, Hupp Corp., Cleveland. A companion piece lists 80 presses ranging from one to 350-ton capacity and other equipment available for complete metal fabricating service.



The 4th FOR A MEMPHIS INDUSTRIAL PLANT

Seventeen years ago, a big industrial plant in Memphis bought its first Layne well water supply system. It is still producing its original capacity. World War II expansion necessitated the addition of two more Layne units. Now the fourth has been completed and is in operation producing 1790 GPM whereas only 1500 GPM was promised by the contract.

This is a typical case of where the first Layne installation proves to be so satisfactory that, as more water is needed, other Layne units are ordered as a matter of course. Certainly this industrial plant,—or any big user of ground water, could make no finer investment.

Every Layne installation is carefully engineered from the original survey to the final testing. All have the same unmatched features of high efficiency, low upkeep cost and extra long life.

For further information, catalogs etc., address

LAYNE & BOWLER, INC.
General Offices, Memphis 8, Tenn.

Layne
WATER SUPPLY
WELLS & PUMPS

Nickel Plating System

(Continued from Page 96)

Hard Nickel Type Bath

24 oz./gal. nickel sulphate
3 oz./gal. ammonium chloride
4 oz./gal. boric acid
pH 5.6-5.9
Temperature 110-140°F.
Current density range 25-50 amp./sq. ft.

Typical physical properties of the deposits are as follows:

Hardness (Vickers)	425
Tensile strength	152,000 psi.
Elongation	6% in 2 inches.

By varying the pH and the temperature within the limits shown, a range of controllable hardness can be obtained as illustrated on p. 96. The deposit has a rather low annealing temperature and will not retain full hardness at temperatures above 450° F.

Barrel Plating Technique—Proprietary bright solutions have been developed for barrel nickel plating. The following solution has been recommended where a gray deposit is satisfactory:

Barrel Plating Type Bath

20 oz./gal. nickel sulphate
4 oz./gal. ammonium chloride
4 oz./gal. boric acid
pH 5.0-5.5
Room temperature

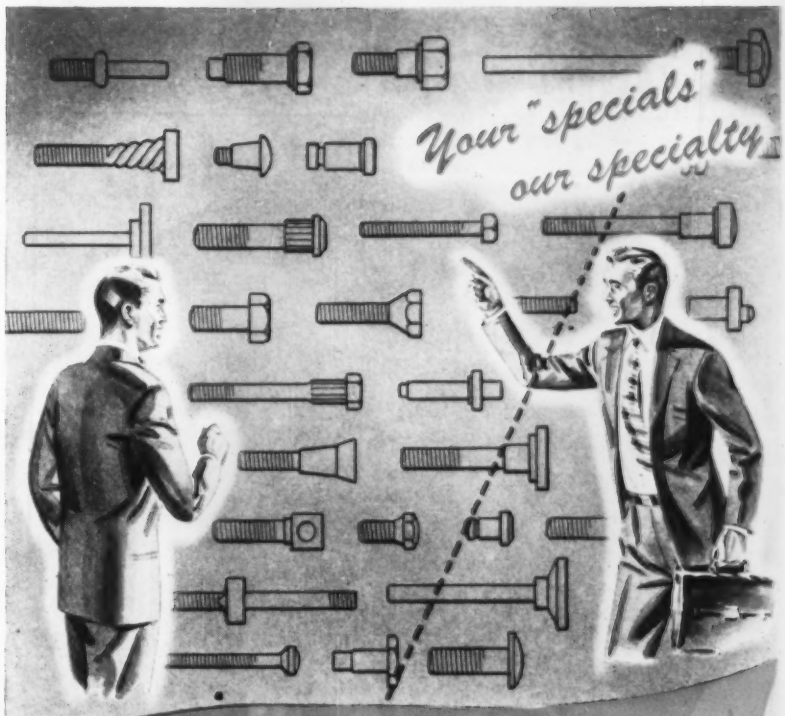
The current density at which this solution should be operated is difficult to specify due to the nature of barrel plating and the movement of the work in the barrel. Barrels should be used with the largest size openings which still do not permit the work to fall through. Care should be taken that the articles do not nest. The contacts into the work should be made in a manner so as to make a good electrical connection but precautions should be taken so that they do not bend or hammer the work out of shape.

Special Purpose Baths—There are cases where cold nickel solutions are being used for plating on interior parts not subject to corrosive conditions. One typical application is for jewelry plating under gold and silver plate, in which case a bath of the following composition is often used:

Cold Type Bath

16 oz./gal. nickel sulphate
2 oz./gal. ammonium chloride
2 oz./gal. boric acid
pH 5.0-5.5
Room temperature
Current density range 5-10 amp./sq. ft.

In using this bath a common practice is to add a brightening agent such as gum tragacanth, gum arabic or cadmium. In general, deposits



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produced from such baths are brittle and are not satisfactory as a base for a subsequent chromium plate.

A special type plating; practiced to a limited extent, is known as black nickel plating. It should be considered only as a decorative black finish. Its function is simply to achieve color effects. Since it does not possess corrosion resistance it should be plated over base metals which are resistant to corrosion. In practice, thin deposits are recommended since thicker deposits tend to flake because of lack of ductility and adhesion that is sufficient to withstand shock.

Useful Mechanical Properties — The wide choice of mechanical properties in nickel deposits available for engineering purposes is illustrated by data compiled by International Nickel and given in the table. While electrodeposited nickel cannot be expected to give the extreme wear resistance shown by chromium deposits, nickel work hardens rapidly under sliding action and the wear resistance of relatively soft deposits will, under many conditions, equal that of deposits which were initially of higher hardness. When plated surfaces are to be subjected to pressure or hammering the hard nickel is preferred over the soft nickel.

While nickel electrodeposits may be ground to required finished dimensions, their machinability is advantageous for their use in reclaiming

Time Saver on Engine Lathes

ADJUSTABLE stops for engine lathes are used by machinists at Northrop Aircraft, Hawthorne, Calif., to save time on jobs requiring multiple lathe return settings. Suggested by the stops used on turret lathes, the idea is being applied to nearly all engine lathes at Northrop and results in appreciable time and cost reductions. Stops were made in company's shops

and repair work. Many parts are difficult to grind to a finish and certain finishing operations can be carried out with nickel which are not practical with chromium deposits. Inherently, nickel may be plated at higher speed than chromium, and a further advantage of nickel is its greater ability to deposit in recessed areas.

Nickel and chromium work as well together in heavy industrial plating as they do in decorative work. When steel or other basic metals are properly prepared, nickel deposits adhere perfectly and chromium is deposited as easily or more so on nickel than on steel.

Nickel may be used to build up rapidly the major portion of the deposit, and when this is then coated with a relatively thin deposit of hard chromium, a product with a long life expectancy is obtained.

Vigorous Cleaning Needed—A high degree of adherence is essential in many industrial applications of heavy nickel deposits. The cleaning procedures which are described here have been evaluated by means of the Ollard adhesion test and found to yield a high order of adhesion of electrodeposited nickel to the base specified. The cleaning methods are all so vigorous that appreciable etching of the base surface occurs. They are not recommended, therefore, as preliminary treatments for decorative plating but are intended for use with heavy deposits or where the surface appearance is not an important factor.

The surface to be plated should have a smooth finish free from scoring or pits. The best results are obtained on finely machined, ground or sandblasted surfaces. The first step in cleaning is degreasing. Subsequent steps are as follows:

1. Pumice scrub and water rinse.
2. Cathodic alkaline treatment for 2 minutes at 100 amp./sq. ft., in a regular alkaline electrolytic cleaning solution. The work is cathode, and nickel or steel sheet anodes can be used.
3. Pumice scrub and water rinse.
4. Second cathodic alkaline treatment for ½-minute.
5. Water rinse.

This is followed by acid treatment varied to suit the particular base metal under consideration.

Handling Heavy Work—In plating heavy deposits, a thorough consideration of the shape of the part is necessary to determine the optimum location for thieves, shields, auxiliary anodes, tank spacing, etc., for the best results. Some of the factors which should be considered are: De-

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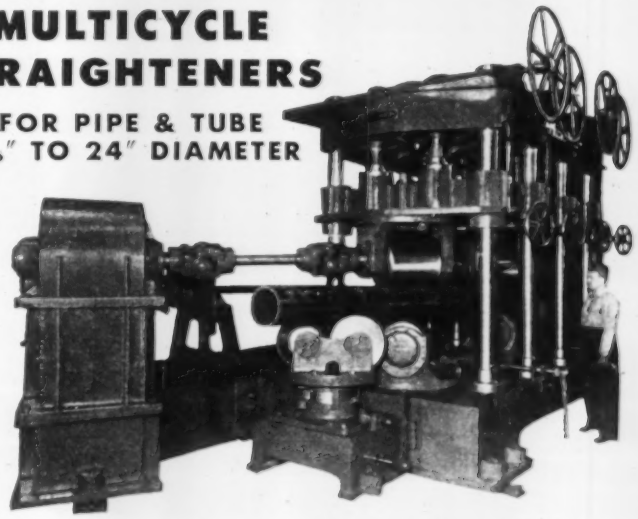
FOR PIPE & TUBE 1/16" TO 24" DIAMETER



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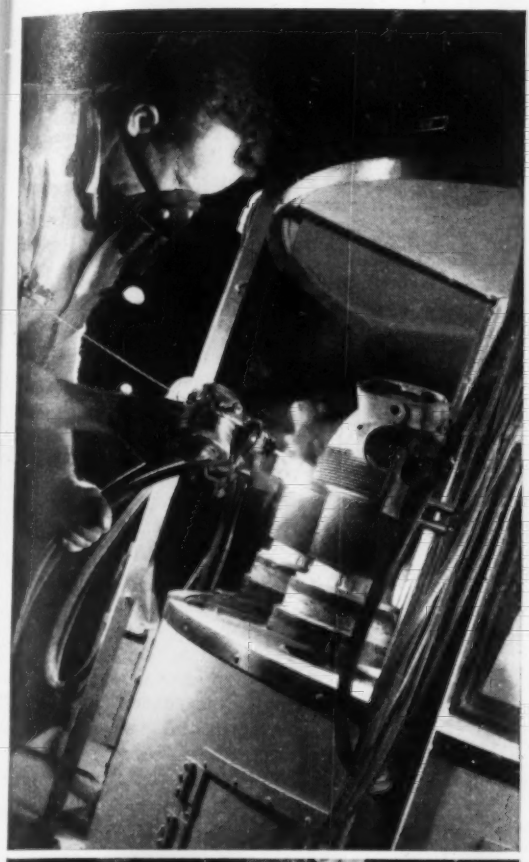

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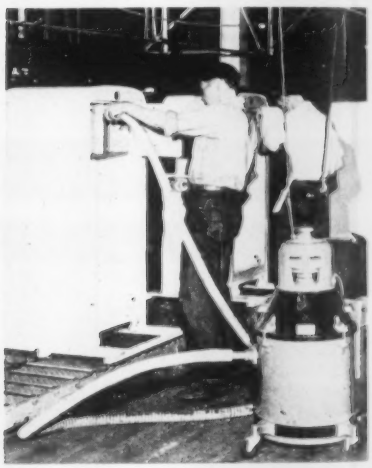
posit specifications; shape of surface to be plated; type and method of stop-off; method of holding work and distribution controls; size of holder and materials of construction; its strength and rigidity; total current required; total quantity and size of parts; and adaptability for other similar work.

Whenever possible, sharp edges and corners should be rounded off and angles should be filleted. Brazing, silver soldering, welding and even low-temperature soldering may be used to form fillets when they cannot be provided mechanically. External surfaces on cylindrical rods, tubes, circular plates and internal cylinders have been handled by extending the form of the part. Any build-up will form on the extension, which is removed after plating, and the part receives a uniform deposit.

Wire or thin strip thieves, preferably of nickel, are fastened rigidly to the holder or part to minimize excessive build-up on edges, corners and other sharp areas. Nonconducting shields, either fastened to the part or hung in the bath, can also be used to prevent current concentration at these points. In placing the shields care must be taken so

Dirt and Insulation Disappear



CLEANING dirt and loose insulation fibers incident to manufacture at Seeger Refrigerator Co., St. Paul, is handled with industrial vacuum cleaners made by Multi-Clean Products of the same city. Two units operating on the assembly line for the last year on two shifts have effected savings of $6000 per year per unit. Large commercial boxes are cleaned in 5 minutes, cutting former cleaning time in half and giving a superior cleaning job. Best indication of their success: Seeger bought two more for filling a defense contract

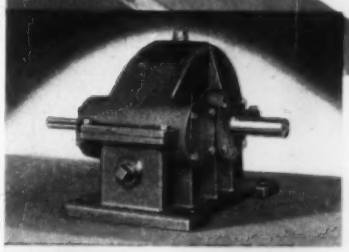
that no gas bubbles are trapped where they will block off an area to be plated. Auxiliary or conforming anodes can be used to plate recesses or unusual shapes. They should be connected through a separate rheostat and ammeter so that the operator can control the current. Nickel tubes, rods, shot in perforated cylinders, or insoluble anodes are used as internal anodes. Bi-polar electrodes have also been used.

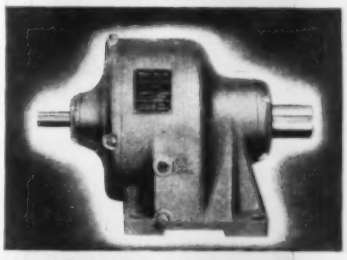
Whenever possible the part should be suspended with the area to be plated vertical; otherwise roughness may develop due to the settling of fine particles. An effort should also be made to avoid the evolution of gas bubbles at blind surfaces. Cathode and anodes should be carefully arranged in the tank to give as uniform current distribution as possible. The proper size of anode is also important; it is known, for example, that even with adequate agitation deposits are thicker on the bottom than on the top of a cathode, but an anode shorter in length than the cathode will give more uniform distribution.

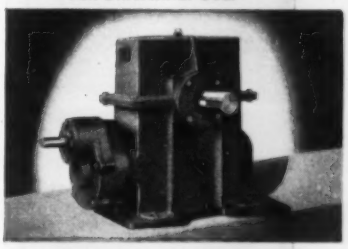
In spacing the electrodes, it is generally accepted that a greater anode-cathode distance is necessary when plating articles of irregular shape possessing recessed areas. At the same time, it is necessary that only the intended current reach a specific area and that current intended for one cathode shall not get to another. This can be achieved by proper spacing or by the judicious use of non-conducting shields between parts. With deeply recessed parts it may be necessary to plate the piece to the desired thickness on the exposed surfaces, then stop off these areas and resume plating the recessed areas to specification, possibly at low current density, or with the use of auxiliary anodes.

Filtration and Agitation — Even under ideal conditions a certain amount of roughness may develop in heavy deposits. For this reason anode bags and continuous filtration are essential features of heavy nickel plating, and every precaution should be taken to prevent dust and other particles from falling into the bath. Some anode bags will allow fine metallic particles to pass through into the bath, bags may break, small tears may appear, possibilities all pointing to the necessity for continuous filtration.

In many installations the filtering unit is a part of the tank heating system as in heat exchangers. As a general rule, a volume equal to that of the entire tank should pass through the filter every hour. A de-


Helical Gear


Pat. Differential Gear


Worm-Helical Gear

Worm Gear

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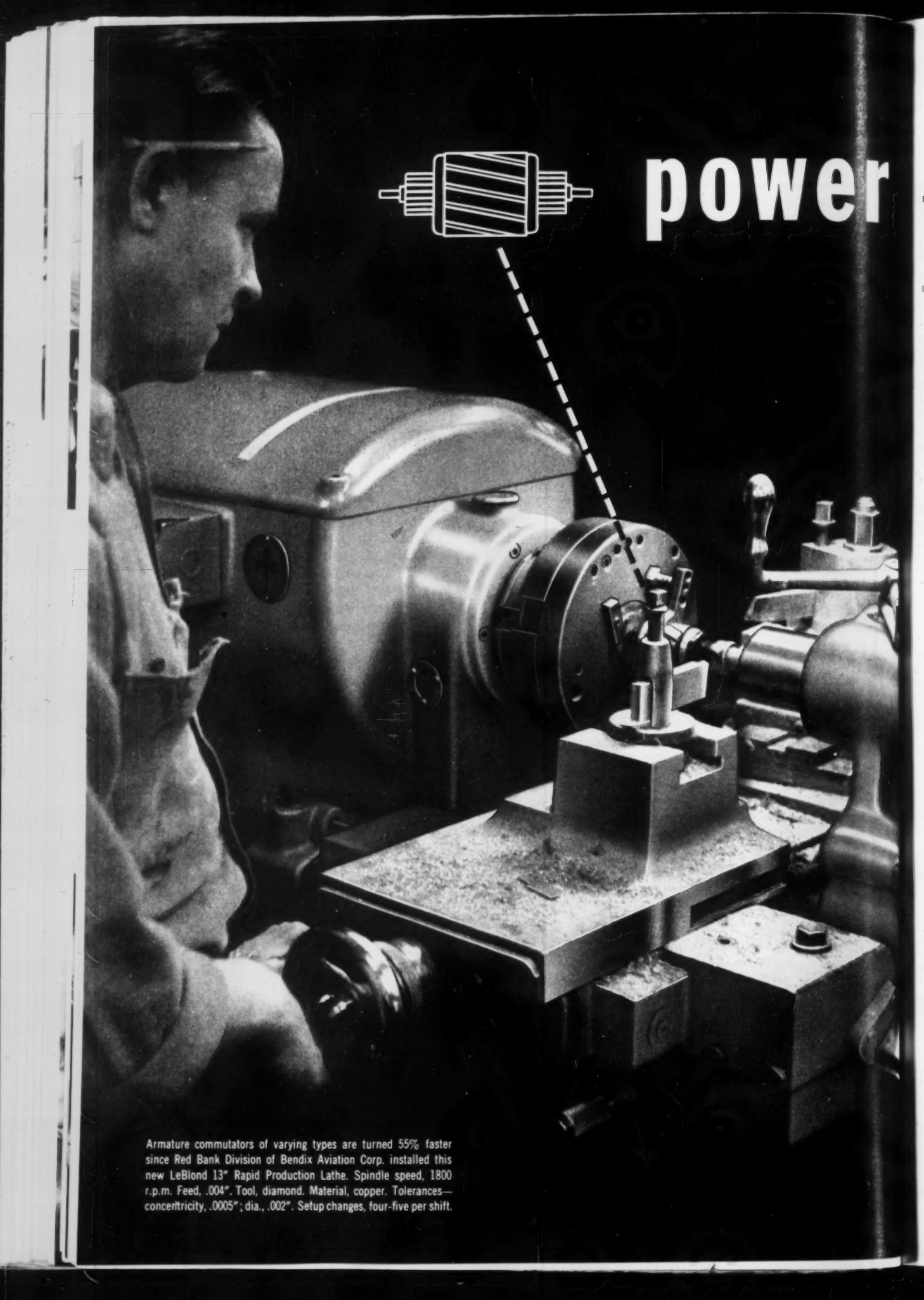

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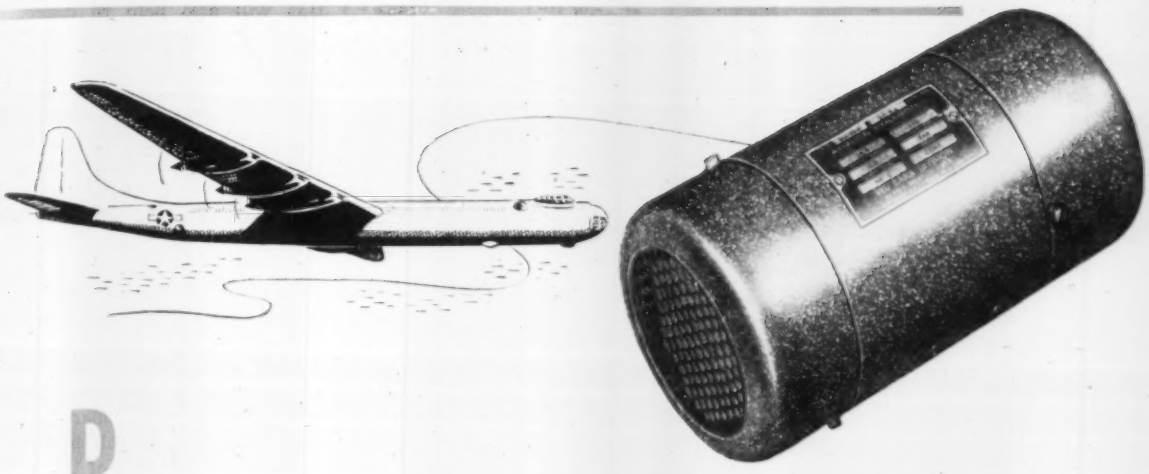
for an airplane's eyes and ears



Power for vital radar and communications equipment in airplanes is supplied by dynamotors like this. They're made in dozens of types and sizes to provide precise, unfailing power for the variety of electronic accessories used in modern aircraft.

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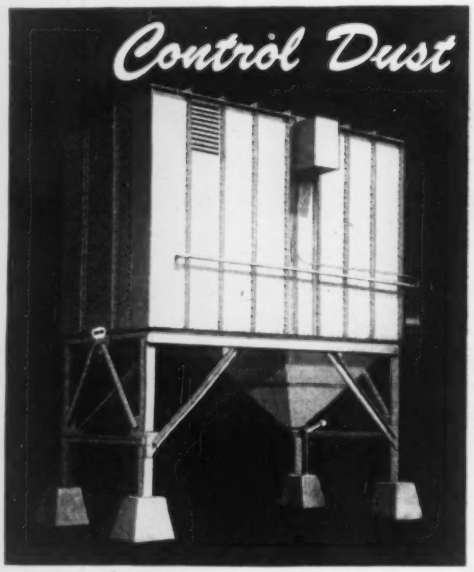

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sirable arrangement is to have two tank outlets, one near the bottom and one at the solution level to skim off the surface. Even with continuous filtration, periodic pumping of the bath into a storage tank and a thorough cleaning of the plating tank is a recommended procedure. In addition to bath agitation developed by continuous filtration, agitation of the part is also desirable whenever possible to permit higher current densities to be used. Agitation will also help to dislodge gas bubbles.

Avoid Current Interruption — During the nickel plating operation it is important that the current be uninterrupted, since anything other than a momentary stoppage may result in a lamination in the deposit. If a current interruption occurs, lacking an auxiliary supply, the current should be switched off at once, the parts removed from the tank, cleaned, stripped and rinsed before replating.

Plating on Rolls — The plating of large cylinders and rolls is being practiced to a considerable extent, and in many cases this is being done with only about 1/15 of the total surface area below the solution level at

Slag Pit Cleaning Simplified

SLAG HANDLING in a bank of 14 open hearths is an easy job for this tractor made by Allis-Chalmers Mfg. Co., Milwaukee. It replaces slow hand labor, overhead crane handling of slag and reduces the number of moves the ladle crane makes in spotting slag pans. The tractor loads from three to four pits and starts cleaning a pit right after the furnace is tapped, often working next to the hot ingot molds. In addition it handles loam clay for lining runners, spots cars and has a hook attached to the bucket for placing machinery and carrying pipe

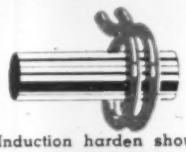
The Old Way

1 Start with 1⅝" round, 4½" long. Weight 2.64 lbs.

2 Stock: S. A. E. 1060 annealed for machinability.

3 Machine to 1.3780" diameter, except shoulder 3/32" wide and .111" high. .736 lb. of metal removed.

4



5 Induction harden shoulder to Rockwell C 62.

6 Grind shaft both ends.

with RELIANCE RINGS

1 Start with 1.3780" round. 4½" long. Weight 1.89 lbs.

Saving .75 lb.

2 Stock: S. A. E. 1060, turned and ground.

3 Machine groove .105" wide and .045" deep. Approximately .004 lb. of metal removed. .732 lb. less metal to remove.

Note saving of machining.

4 Assemble ring in groove.

A simple operation.

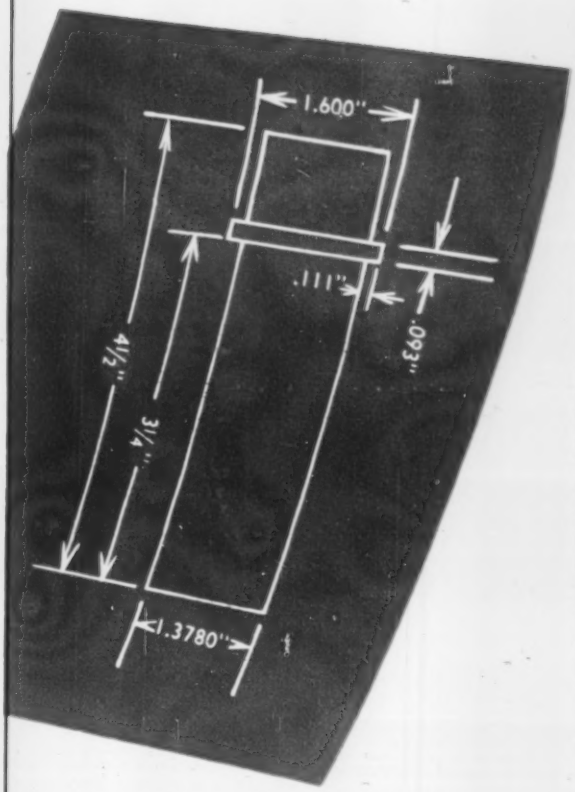
5 Ring already hardened.

No heat treating necessary.

6 Shaft already ground.

No grinding necessary.

Assembly has ultimate sheur strength of 37,000 lbs., when snap ring and shaft are of the same hardness. Will withstand pressures in excess of 5000 lbs.



are there any *Savings like this* in your product?

The illustration shows a common cost-cutting application of Reliance Rings in the production of shouldered shafts. They may also be used to produce shoulders in bores.

Made from carbon, alloy or stainless steel, or non-ferrous metal to specified physicals . . . of any desired cross section and diameter . . . welded or open with ends shaped to meet any requirement . . . Reliance Rings offer limitless possibilities for reducing costs, speeding production and improving product performance.

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RELIANCE SPRING LOCK WASHERS

—in American Standard sizes—compensate for looseness of bolted parts. Keep bolted assemblies tighter longer.

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any one time. The rotational speed should be such that the roll surface does not become dry. This permits a smaller tank (often in the shape of a trough), less solution and eliminates the difficulty of immersed bearings. The maximum permissible current density can be quite high, around 200 amp./sq. ft. because of the efficient agitation. Where the as-plated deposit must be so smooth that only a final buffing operation is needed, then 20-30 amp./sq. ft. may be the maximum current density. As the chloride bath produces an inherently smooth deposit, its use is indicated for this work. Every precaution should be taken to eliminate airborne dust, anode sludge and other foreign particles. A squeegee along the roll, at a point where the roll enters the bath, will help to eliminate roughness. The ends of the roll will build up at an excessive rate unless a shield is used.

Effect of Temperature — Hard nickel deposits tend to soften when subjected to temperatures of 500°F. or over. The following tabulation indicates the effect of temperature and time of exposure on the hardness of the deposit.

Initial hardness	Time (hrs.)	Temp. °F.	Final Hardness (Vickers)
325	18	400	295
325	1 week	400	295
325	18	500	295
470	24	500	400-450
475	4	600	222
445	4	600	380

Nickel deposits can be annealed to decrease the hardness and improve the ductility. Work at International Nickel has shown that the ductility of a nickel deposit from a standard Watts solution can be increased from 37 per cent "as plated" to 54 per cent by annealing for 15 minutes at 1400°F.

Machining and Grinding — While chromium deposits have to be ground to dimensions, hard nickel deposits can be machined or ground. Shaping or planing of deposits is not advisable but milling is practical. Cutting tools of the cast nonferrous and cemented carbide types are recommended. A mixture of soluble oil and water should be used as a coolant. Suggested cutting speeds are 80 and 120-175 fpm, respectively, for the two types of tools. The feed in inches per revolution for both types should be in the neighborhood of 0.008 for finish cuts and 0.010-0.015 for roughing cuts.

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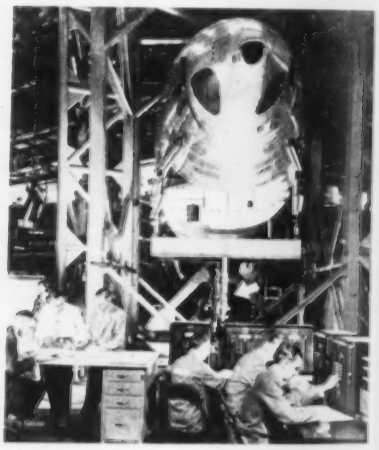
Stress Measurement for Stratojet



STRUCTURAL tests of the B-47 Stratojet bomber at Boeing Airplane Co.'s Wichita, Kan., plant used 32 Baldwin SR-4 load cells with readings taken at a central point into which the cells were wired to two self balancing indicators. This was made possible by calibrating the indicator in per cent load rather than pounds and all cells were matched and calibrated to rated capacity at 100 per cent on the indicator. One of these load cells is shown in the vertical tension member centered under bomber's nose

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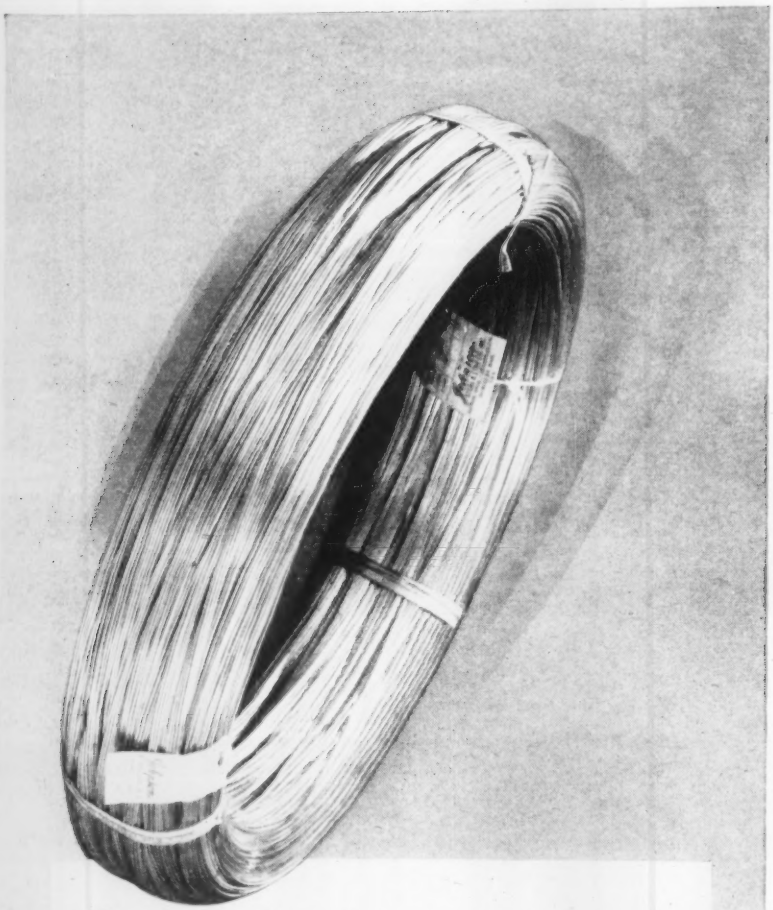

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New Books

Quality Control Bibliography

A Bibliography of Statistical Quality Control, Supplement, by Grant I Butterbaugh; paper cover, 141 pages, 6 x 9 inches; published by University of Washington Press, Seattle, Wash. for $2.00; available from STEEL, Penton Bldg., Cleveland 13, O.

The original edition was issued in 1946 and listed 712 articles, manuals and books on statistical quality control appearing in English within the period from 1924 to the beginning of 1946. This supplement covers the period from 1946 through June, 1949. It lists approximately 725 items.

The supplement is divided into three parts: Part I, periodical literature; Part II, manuals, monographs, pamphlets; Part III, books. Indexes of authors and subjects are included. The index of subjects covers both the original volume and the supplement.

Hot Dip Galvanizing

Galvanizing (Hot Dip), by Heinz Bablik; cloth, 502 pages, 5 x 8¼ inches; published by E. & F. N. Spon, Ltd., London, England.

The third edition of this book has been completely rewritten and incorporates all the results of recent scientific research and practical experience in galvanizing. It is devoted entirely to hot dip galvanizing and those parts dealing with the theory of pickling, especially the iron-zinc reaction and fusion reaction, have been developed and extended to a high degree.

A brief history is given in the introduction and the fields of application are discussed with tables to illustrate various points. The book is divided into six chapters. Chapter I deals with scale—its structure and composition, iron oxides, formation and thickness of the scale layer. Pickling theory is discussed in the second chapter and covers pickling agents; general theory; pickling reactions with oxides, iron base and on oxides and iron base; factors governing velocity in pickling; influences of individual factors on part-reactions; total pickling reaction; effects of pickling. The third chapter deals with pickling practice—the raw material, choice of acid, preparation of the baths, acid consumption, control of pickling baths, the pickling plant and special pickling processes.

Purpose and nature of fluxes is presented in chapter IV. It goes on to explain the action of the flux, general chemistry of the fluxes, fluxes

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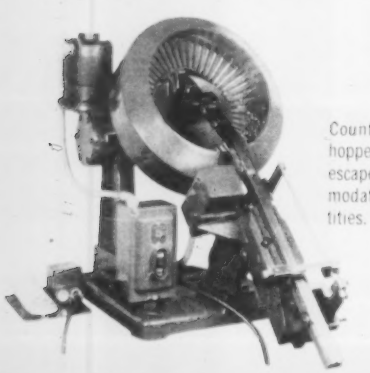

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in wet and dry galvanizing, flux, ash, raw materials, mode of application, peculiarities and faults.

In chapter V, the author presents the galvanizing theory concerning formation of the coating and alloy layers, structures, properties of the reactants and coating, corrosion and effect on the iron base. Galvanizing practice is discussed in the final chapter—zinc and zinc containing scrap, galvanizing tanks, galvanizing processes, surface treatment of hot dip galvanized coatings and examination of the coatings.

The well-illustrated book is concluded with a list of British standard specifications and ASTM specifications.

Operation of Quality Control

Quality Control: Principles, Practice and Administration, by A. V. Feigenbaum, secretary, Quality Control Co-ordinating Committee, General Electric Co., Schenectady, N. Y.; cloth, 443 pages, 6 x 9 inches; published by McGraw-Hill Book Co. Inc., New York, for $7.00; available from STEEL, Penton Bldg., Cleveland 13, O.

This book presents a clear picture of the entire quality control operation, from both an organization-administrative and a technical viewpoint. It defines the term quality control, tells what its activities are, tells how it can be used for mass production and in the the job shop. It also explains how statistical methods fit into the quality control pattern and what it means to the foreman, design engineer, salesman, etc. Human relations are shown to be a basic issue in quality control activities.

The reference guide book contains 14 chapters which are consolidated into four parts. Each part may be used as a unit in itself so that those interested in operations that comprise only a portion of the complete quality control program may use the book. Several fundamental operating rules are presented at the beginning of the book under the title "The Principles of Quality Control". Part I, Quality Control—Tool of Management, presents quality control from the overall administrative point of view. Part II, The Statistical Point of View, presents in basic algebra and arithmetic the point of view that is represented by industrial statistics. Formulas, charts and tables are furnished in this section. Part III, Applying Quality Control in the Plant, discusses the applications of quality control methods to plant problems. The four jobs carried on in an overall program are treated in detail. Part IV, Introducing Quality Control Into the Plant, approaches the problem of how to sell the program of quality

control to members of the organization. The final chapter is a summary of quality control and gives the conclusion that while quality control is not a panacea that will gain for management its product quality objectives overnight, it is necessary because existing, unco-ordinated, individual quality control techniques are not able to cope with customer's demands for greater precision and the diffusion of quality responsibility. It attacks these two factors directly through improved organization for attaining quality objectives and more effective use of technical methods.

Problems of Nuclear Technology

Industrial and Safety Problems of Nuclear Technology, edited by Morris H. Shamos, assistant professor of physics, Washington Square College, New York University and Sidney G. Roth, assistant professor of mathematics in the College of Engineering and director of technical studies in the division of General Education, New York University; cloth, 368 pages, 5½ x 8¼ inches; published by Harper & Brothers, New York, for $4.00; available from STEEL, Penton Bldg., Cleveland 13, O.

Technological problems and dangers peculiar to the development of atomic power that were discussed at a three-day conference sponsored jointly by the Atomic Energy Commission and New York University's Division of General Education are presented in this book. Authors of the papers are 21 leaders in the fields of industrial development, nuclear research, radiation medicine and casualty insurance.

Part I, United States Atomic Energy Commission, discusses the organization and operation of the commission in detail. Papers in this group include Horizons for Atomic Energy by Gordon Dean, Status of Nonmilitary Atomic Energy Development, by Wilbur E. Kelley, Contracts with the United States Atomic Energy Commission by W. K. Maher, Patents and Inventions Under Contracts of the Atomic Energy Commission by H. R. Mayers.

Parts II and III deal with the fundamentals of nuclear physics, nuclear apparatus, the radiochemical laboratory and industrial applications of radioactive isotopes. Papers in Part II are Fundamental Particles and Rays by Serge A. Korff, Electronuclear Apparatus by G. K. Green, Radioactive Materials by Warren E. Winsche, Isotopes: Present and Potential Uses by Paul C. Aebersold, What Radioisotopes Can Mean to Industry by Charles Rosenblum. Those in Part III include A Typical Radiochemical Laboratory by Thomas Lanahan, Instrument Problems of

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the Radiochemical Laboratory by V. L. Parsegian, J. S. Balderston and D. S. Ballantine; Planning and Evaluating Industrial Tracer Experiments by S. E. Eaton.

In Part IV the possible health hazards associated with the use of radioactive materials are discussed. Papers in this section are: General Health Problems and Safety Procedures by Forrest Western, General Hazards of Nuclear Radiations by G. Failla, Evaluation of Radiation Hazards and Their Control by Bernard S. Wolf, Waste Materials in the United States Atomic Energy Program by Abel Wolman and Arthur E. Gorman, Insurance Problems Associated with Atomic Energy Use by J. Dewey Dorsett, Atomic Energy and the Fireman by Edward J. Kehoe.

Two panel discussions from the conference are presented in the appendix.

Manganese from Slag

A miniature blast furnace working with slag may prove to be one of the most important furnaces in the country, according to American Iron and Steel Institute. This furnace, 16 feet high, started operating early in March in an attempt to recover the manganese in slag from open hearth furnaces.

Research on manganese has been intensive in recent months to avert possible domestic shortage if foreign sources of supply are drastically reduced. Some research metallurgists believe that an estimated 440,000 tons a year of managanese may be found in this country in economically recoverable open hearth slag. That tonnage is equal to approximately 68 per cent of the amount used in steel manufacturing during 1950.

The small blast furnace will simulate conditions in a commercial structure in attempts to remove undesirables such as phosphorus, from the open hearth slag. If the theory being tested at Pittsburgh proves practical, a useful ferroalloy containing 80 per cent manganese will be produced.

Other methods of recovering manganese from slag are being studied at College Park, Md., and still a third project sponsored by steel companies through American Iron and Steel Institute may soon be undertaken.

Standardized Equipment Parts

Standardization and stocking of all components of its industrial control boards was recently announced by Visi-Trol Corp., Detroit. This will help expedite layout, assembly and delivery of the equipment to meet industrial needs under the defense program.

Component parts include steel channels in several widths; plastic letters, figures and strips; moldings and accessories. Shapes and dimensions selected were based on an extensive study covering a large variety of applications in the visual control of scheduling, quality, purchasing, inventory, machine and plant loads, budgets, engineering programs, follow-ups, sales, advertising, etc.

As a result of this development, the company can now custom-assemble at short notice, and the system can be revised, developed or expanded while in use to fit changing conditions without requiring replacing of the entire system.

Features of control boards assembled from the newly standardized components are:

More graphic lines of data per foot, without sacrifice in visibility. Channels can be assembled vertically, horizontally or diagonally or any combination thereof. Rapid posting. Flame-resistant letters, strips, etc., snap in or out of channels. Telescopic strips speed chart changes. Maximum visibility. "Photogenic" and plain strips available in several standard colors and designs to give full information at a glance, and double-rolled safety steel channels.

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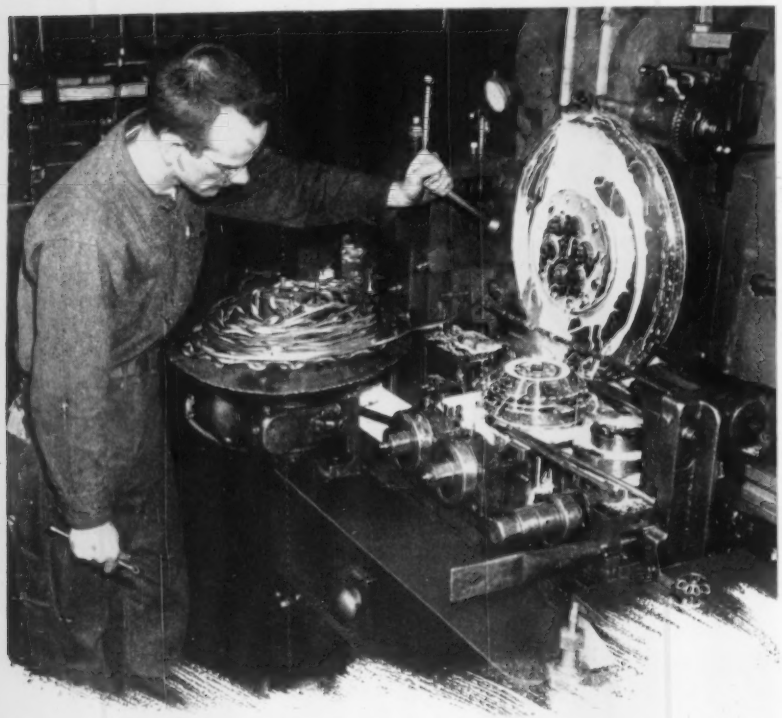

THE WELDING OPERATION involves a split electrode with current passing from one side to the other, heating the tube to welding temperature. The side pressure rolls then force the bond. Excess metal is peeled off, making a clean, neat tube. Busy as we are in times like these, this operation gets careful supervision at Brainard. We have complete control of every operation from ore to tube. That's why it will pay you to call on Brainard first when you have a job for electric welded mechanical tubing. Straight or fabricated. Sizes: ½" to 4"—.025 to 165.

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Brainard STEEL COMPANY WARREN, OHIO

New Products and Equipment

Versatile Hydraulic Press

Press & Co., 1401 E. 57th St., Chicago 37, Ill., is producing a motor-driven hydraulic press for assembling, broaching, drawing, forming, laminating, riveting and general forging operations. This press is double acting and has an 8-inch throat with 12-inch ram travel. Clearance under the retracted ram is 16 inches. Ram speed is 60 inches per minute down

and 90 inches per minute up under full load.

A foot pedal controls the ram which is activated by a vane—type pump set to operate at 1250 psi. Entire press is of steel welded construction except for the cylinder which is a Meehanite metal casting. Power unit is contained in the base and occupies 28 x 34 inches of floor space.

Check No. 1 on Reply Card for more Details

Manual Handling Eliminated

A portable elevator-conveyor announced by E. W. Buschman Co., Cincinnati, O., and designed to eliminate multiple manual handling of stampings is known as the Press-Vator. Device is essentially a small cleated conveyor belt, self-powered and adjustable to various loading and unloading heights. As parts drop from the stamping press they are automatically picked up by the unit and delivered to a tote box or elevated to a gravity chute leading to the next operation.

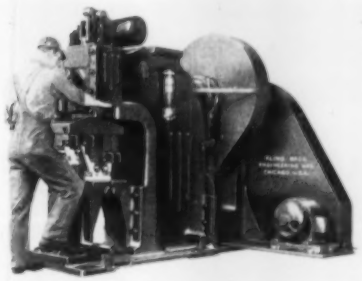
To meet the variety of stamping operations 6 and 8-foot models are available. Standard model P-1206 (illustrated) has a 6-foot 5-inch length from center to center of pulleys. It is powered by a 1/3-hp gearhead mo-

tor which drives the belt at 72 feet per minute. Minimum loading height is 7 inches, maximum unloading height is 61½ inches and maximum inclination is 45 degrees.

Check No. 2 on Reply Card for more Details

Improved Universal Punch

Designed to meet the demand for an open end beam punch similar to larger unit presented about a year ago, Kling Bros. Engineering Works, 1320-1332 N. Kostner Ave., Chicago 51, Ill., is introducing a No. 7 uni-



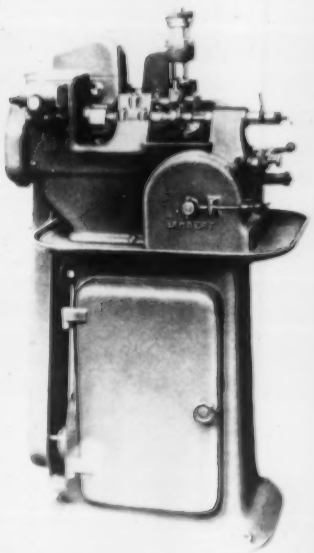
versal punch. It has a rating of 118 tons, weighs approximately 18,000 pounds without motor and takes up floor space of 36 x 118 inches. A 7½-hp motor drives the flywheel through V-belts.

This machine has capacity for punching a 1¼-inch hole through 1-inch material in the center of the ram and a 1⅞-inch hole through ¾-inch at 10½ inches from center of ram. Punch comes equipped with three high die blocks, two low die blocks and two gooseneck die blocks. This die block equipment enables the operator to punch in the flanges and webs of beams and channels from 3 to 30 inches. In most cases the web and flange punching can be done without changing setups. H-beams, I-beams, angles and other structural shapes can be handled.

Check No. 3 on Reply Card for more Details

Semiautomatic Hobber

Lambert type 75 semiautomatic gear-hobbing machine made in Switzerland is available from Carl Hirschmann Co., 30 Park Ave., Manhasset, N. Y. Machine is designed for cutting



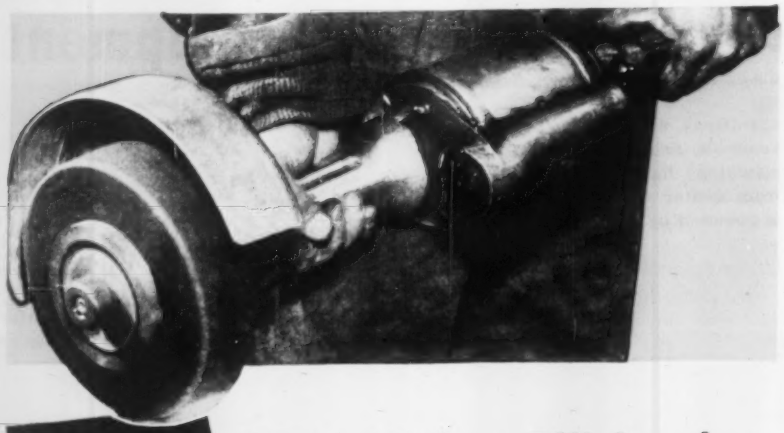
gears with straight teeth, gears with teeth inclined up to an angle of 18 degrees, worm wheels cut radially and, with a special attachment, bevel gears with straight teeth. Automatic radial and longitudinal feed makes this machine suitable for defense work requiring quantity production of small gears.

Diameter of gear cut ranges from a minimum of ⅛-inch to 3.470-inch with a hob of 0.9449-inch diameter and 3.149-inch with a hob of 1.260-inches in diameter. Maximum length hobbed is 1.969 inches for straight gears and 1.181 inches for gears with inclined teeth. Hobbing speeds of 214, 380, 550 and 940 rpm are available. Motor is 0.7 hp at 1500 rpm.

Check No. 4 on Reply Card for more Details

Power Feed Optional

As an optional feature now available on their light duty 16-inch throat band machines the DoAll Co., Des Plaines, Ill., announces the same type standard equipment on heavy duty machines. Power feed is accomplished



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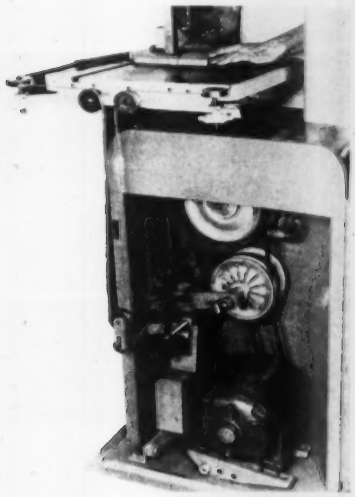
by a weight-actuated feed consisting of a beam arm, a weight adjustable on the beam by means of a handwheel to give variable feed pressure and a pedal-controlled quick release or weight reset. A chain around the workpiece is connected to the weight feed which exerts the feed pressure.

By adjusting the power feed pressure to band speed, type and thickness of material being cut and the

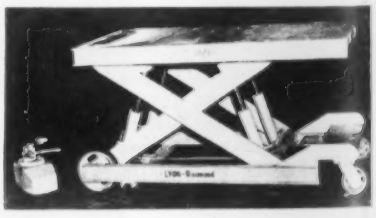


width, pitch and set of the saw band being used, operator obtains the best cutting rate, finish or band life or the most suitable compromise of these results. Feed pressure can be varied while the machine is running by turning a handwheel. This feature is a time saver and convenient when following radii, an operation that requires close control of work feeding pressure.

Check No. 5 on Reply Card for more Details

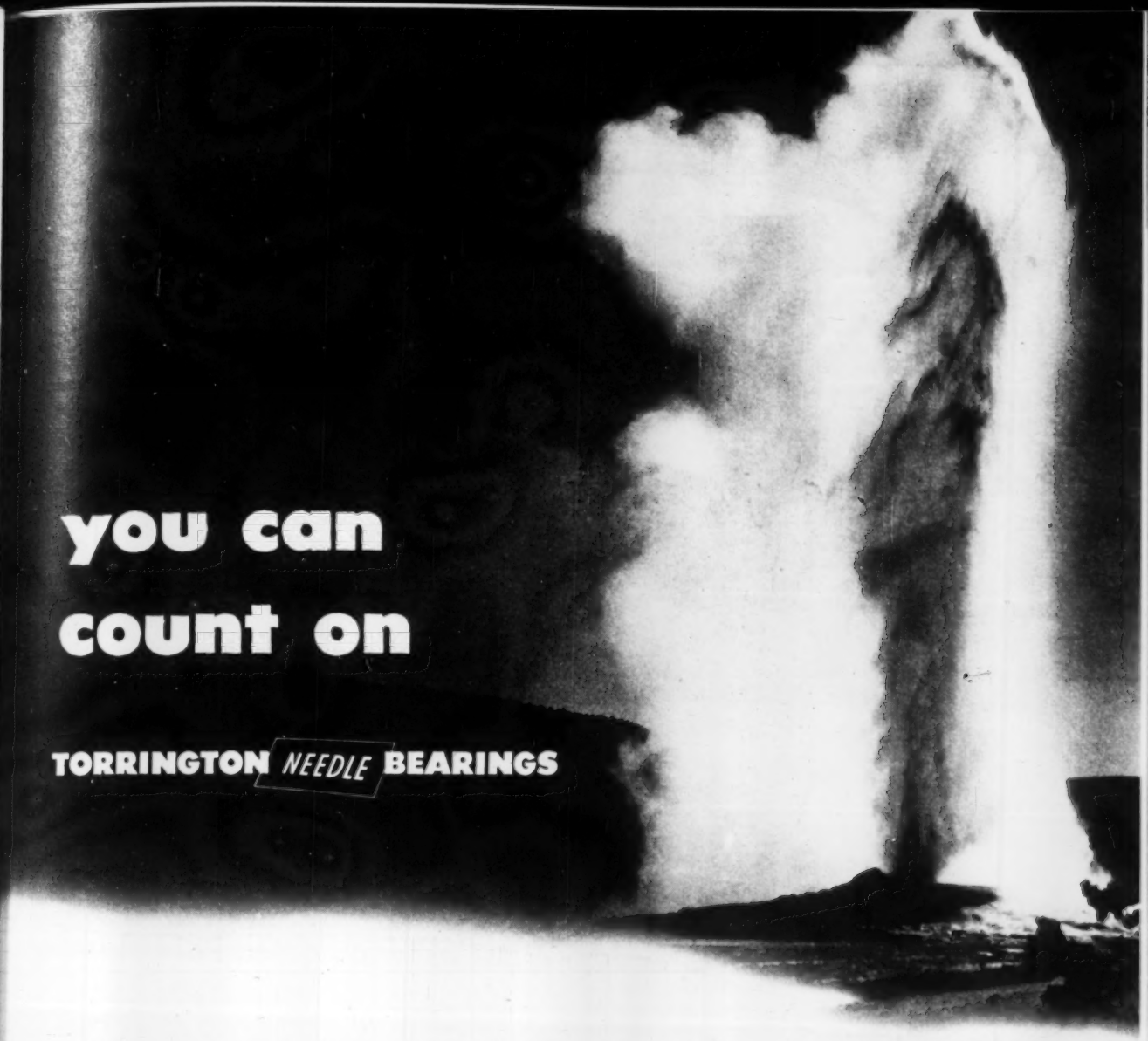
Sheet Feeding Table

Engineers at Lyon-Raymond Corp., 91-81 Madison St., Greene, N. Y., have developed a scissors-type arrangement for the lifting mechanism of the new hydraulic sheet feeding table for handling bundles of square steel sheet. Overall length of the top



is 66 inches and the table elevates from 18 inches in the lowered position to 36 inches. This particular type of construction also provides more rigid support for off center loads.

Table is offered in capacities of



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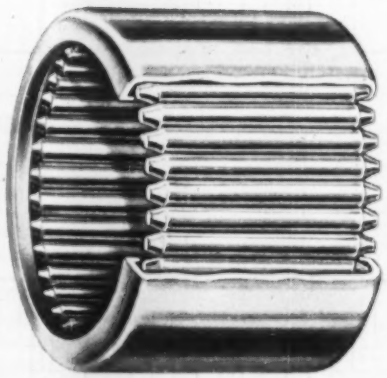

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Our engineers will be glad to help you put these and other Needle Bearing advantages into your product.

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SIMONDS
ABRASIVE CO.
grinding wheels

'Mac' gets lots of attention now

How come? By breaking a productionline bottleneck. How so? By changing over to grinding wheels of slightly different grain and grade. What wheels? Simonds Abrasive Company wheels . . . part of a complete line that may hold the answer to your needs for top production efficiency. It includes grinding wheels, mounted wheels and points, segments and abrasive grain . . . industrially proven products of Simonds Abrasive Company, a major grinding wheel producer for almost 60 years. Write for free data book and name of your nearby distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

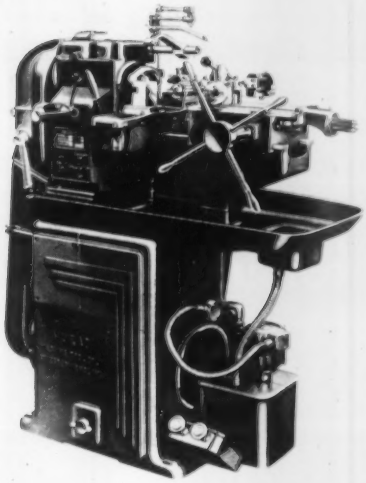
Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

6600 and 10,000 pounds. It is portable having 6-inch swivel casters at the steering end and 10-inch rear wheels. Hydraulic rams working against the lifting levers raise the table. Power is supplied by either a foot operated hydraulic pump or a motor driven hydraulic pumping unit which is available with either pushbutton or pedal type controls.

Check No. 6 on Reply Card for more Details

British Turret Lathe

A high-speed model in the Murad line of turret lathes is available in 1-inch size through British Industries Corp., International Machinery Division, 164 Duane St., New York 13, N. Y. Centralized grouping of the control levers around the electrical control panel promotes simplified operation. Two pedal operated switches located at the right of the pedestal control two motor speeds in 1:4 ratio. Six spindle speeds are available, forward and reverse.



Bar feed is gravity operated and fully guarded. Collet runs in ball bearings and is easily changed. Motors are of three phase, two speed-type. Motor rating is ½-hp at 720 rpm and 2 hp at 2800 rpm.

Check No. 7 on Reply Card for more Details

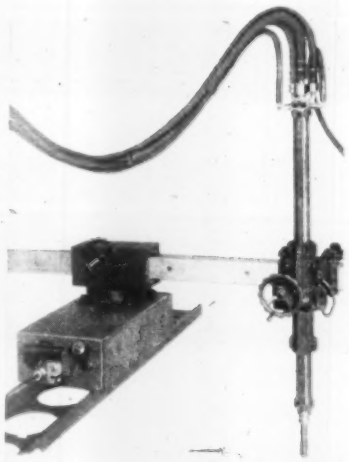
Radiagraph for Big Jobs

A motor driven, straight track-guided machine suitable for shop and mill jobs requiring a travelling carriage to carry equipment past the work is announced by Air Reduction Sales Co., division of Air Reduction Co. Inc., 60 E. 42nd St., New York 7, N. Y.

Airco No. 41 radiagraph simplifies gas cutting, flame hardening and welding operations. It may be used

in steel mills for billet nicking, slab ripping and skull cutting.

Smoothly machined top insures solid and level mounting of equipment. Provisions are made for mounting both cutting and welding heads made by the company. Features of the machine include all-welded con-

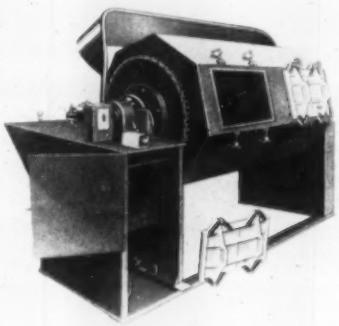


struction, self-contained electric panel, conveniently located controls, insulated bottom plate to protect internal parts from heat and speed ranges from 1 to 72 inches per minute with standard gear reduction unit.

Check No. 8 on Reply Card for more Details

Enclosed Tumbling Barrels

Made in both constant and variable speeds, the Murco tumbling barrels have both the motor and the operating mechanism totally enclosed. D. J. Murray Mfg. Co., Wausau, Wis., designed them so only exposed parts are the controls and magnetic revers-



ing starter. A limit switch permits operation only when the hood is closed.

Illustration shows the 7½-hp constant speed model operating at 25 rpm. The variable speed 7½-hp

OUT OUR WAY

LOOK OUT! YOU YOUNG GUYS MAKE ME NERVOUS, GETTIN' SO CLOSE TO EXPOSED GEARS LIKE THAT!
HE LIKES TO RAZZ TH' YOUNG GENERATION ABOUT THEM HAVING TO PUT COVERS AN' SAFETY DEVICES ON EVERYTHING TO KEEP TH' BABES OUT OF DANGER!
BUT HE KNOWS TH' VALUE OF SAFETY! DIDN'T HE SEND FOR TH' SAMPLE OF SOL-SPEEDI-DRI?
SAFETY CONSCIOUS
J.R.WILLIAMS

First in sales—
because it's first in value

SOL-SPEEDI-DRI

Laboratory tests of many top companies—of independent experts—of our own—all prove that SOL-SPEEDI-DRI is first in value. No wonder, then, that it's America's largest selling oil and grease absorbent! Selected raw materials, careful processing, and laboratory controls keep SOL-SPEEDI-DRI quality always uniform. Send the coupon today for a free sample and brochure about how to keep your floors clean and slip-proof with SOL-SPEEDI-DRI.

SPEEDI-DRI CORP., 210 W. Washington Sq., Philadelphia 5, Pa.

FREE SAMPLE: Fill out the coupon and mail today for big, free sample and brochure.

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S-6-4-51

SPEEDER!
ARALDITE RESINS are used in wing smoothing compounds for jet-type planes. Araldite Resins are being similarly applied on bus bodies, train coaches, etc. Araldite Resins harden quickly . . . can be sanded . . . have high alkali and acid resistance. Non-shrinking . . . deep indentations can be filled quickly.
GRIPPER!
ARALDITE RESINS bond magnetic pole pieces permanently to the gripper arms of this magnetic key inserter*, used to replace split valve keys in gasoline engines. The highly viscous cold-setting Araldite Resin makes a quick, permanent bond of close tolerance and exceptionally high strength at room temperature. (*Zim Mfg. Company.)
Araldite*
ETHOXYLINE RESINS
Fabricators seeking new, improved, simplified, time-and money saving bonding, casting and coating mediums, will find in these new but already extensively applied resins, an exceptional opportunity to put their ideas to work. Details of the properties and typical applications for Araldite Resins are fully described in newly published technical manuals, free upon request written on Company letterhead.
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627 GREENWICH ST.
NEW YORK 14, N.Y.

model has speeds from 8 rpm slow speed to 25 rpm high speed, with an infinite range of speeds in between to meet operating conditions. Speed changes can be made while the barrel is in motion. The foot operated hydraulic brake at floor level stops the barrel in any position. Models are also available in 3 and 5-hp ratings both constant and variable speed.

Check No. 9 on Reply Card for more Details

Production Face Grinder

Medium duty production grinding operation may be performed on the NT-20 face grinder made by Samuel C. Rogers & Co., 183-201 Dutton Ave., Buffalo 11, N. Y. Pump housings, die blocks, gear boxes, armor plating and similar parts up to 12 inches high, 72 inches long and 16 inches wide can

be rough and finish ground by this improved traveling table face grinder.

Constant or variable speed reversing motor table drive or variable speed hydraulic table drives can be provided. Variable speed provides table rates from 10 to 70 feet per minute and is recommended when maximum production and control are desired. Either a 20-inch self-dresing segmental or 20-inch cup grinding wheel is provided and is powered by a heavy-duty 10-hp motor. Coolant water is recommended for all grinding operations and is supplied on the machine by a centrifugal pump with bronze impeller.

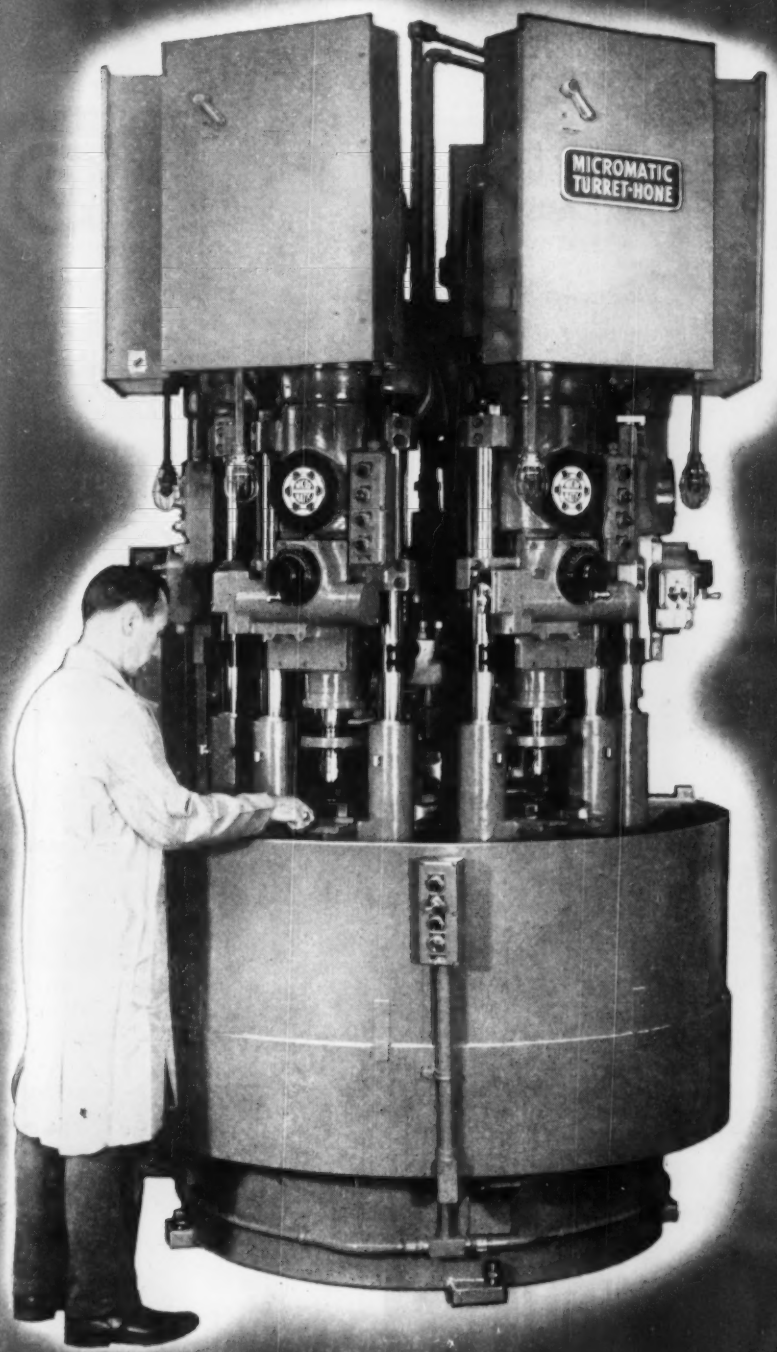
Check No. 10 on Reply Card for more Details

Coating Process Speeded

Norris Gyromat made by Gyromat Corp., P.O. Box 600, Fairfield, Conn., applies a full coverage coating of from 0.0008 to 0.025-inch thickness of any coating material in one passage at high speed. This is accomplished by means of high speed rotors which atomize and direct the paint to the work being passed through the rotating bowl.

Excess material (overspray) is

NEW *High Production ★ High Precision* TURRET • HONE



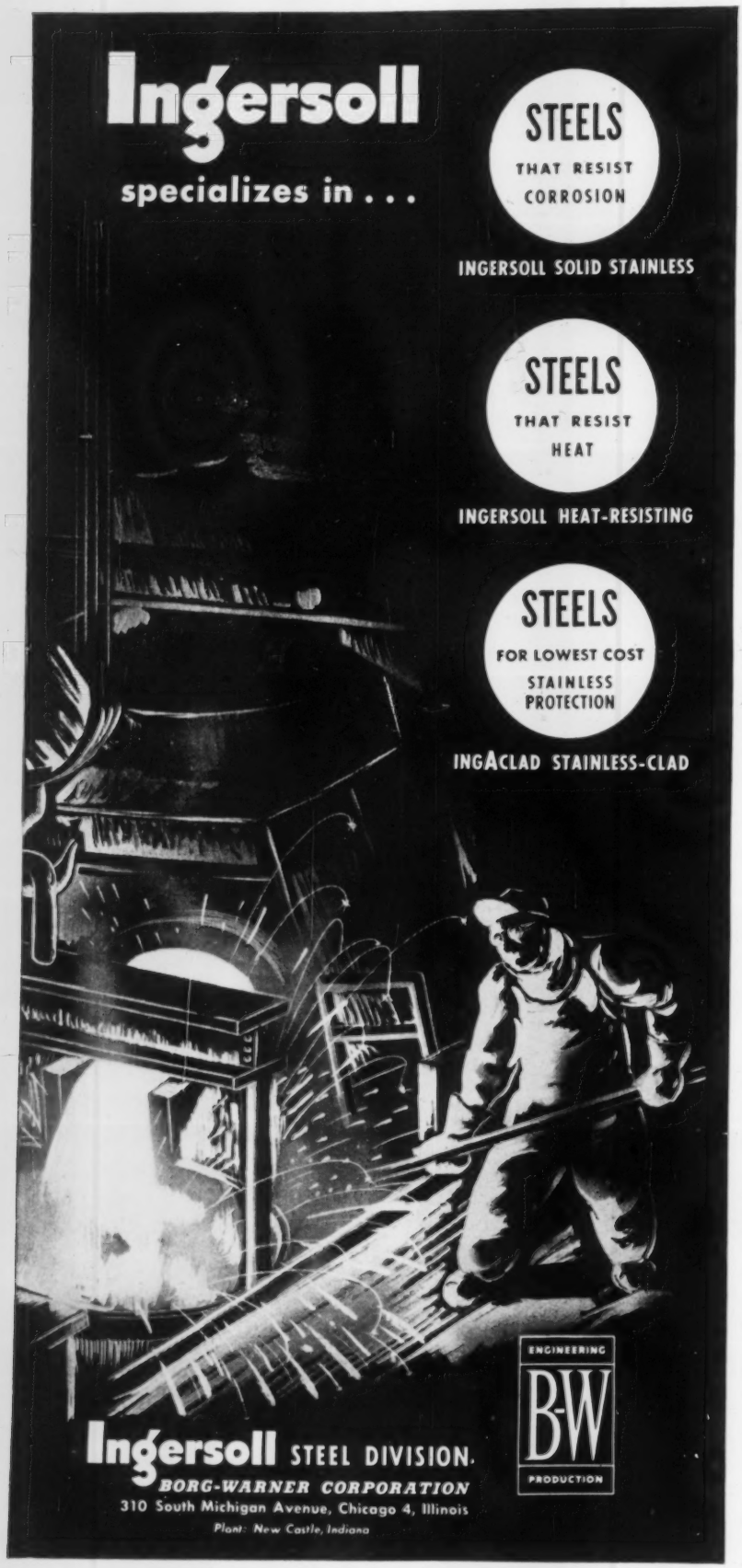
SIX MICROHONING UNITS

One Machine One Operator

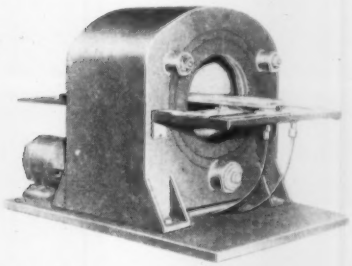
THIS new model 736-6 TURRET-HONE finishes a part every five seconds. The operator unloads and loads the fixtures as they pass the control station. As the loaded fixture leaves the control station it automatically lifts into position, the tool starts rotating, reciprocating and expanding. The machine rotates continuously. When the part is "to size" the automatic MICRO-SIZE control stops the tool and drops the fixture. As the fixture passes the operator again, a new part is loaded and the cycle continues. This is repeated on each unit.

Micromatic Hone Corporation 8100 SCHOOLCRAFT AVENUE DETROIT 4, MICHIGAN

District Field Offices: 1323 So. Santa Fe., Los Angeles 21, California • 614 Empire Building, 206 So. Main St., Rockford, Illinois
55 George St., Brantford, Ontario, Canada • Micromold Manufacturing Div., Boston Post Road, Guilford, Connecticut



caught by the rotating inner bowl and returned to the annulus in its former fluid state and reused, a vapor pressure equilibrium being automatically maintained. Versatile unit



handles coating for electrical relays, electronic parts and bulky metal products as well as a variety of other items.

Check No. 11 on Reply Card for more Details

Heat Transfer Line

Standard line of electrically heated Dowtherm heat transfer units is a development of Struthers Wells Corp., Warren, Pa. Units are ready for immediate use upon delivery being supplied with instruments, piping, insulation and other accessories. Capacities range from 100,000 to 500,000 Btu per hour and temperature range is up to about 750° F using Dowtherm as a liquid or vapor medium. Other heat transfer fluids may be utilized in this equipment.

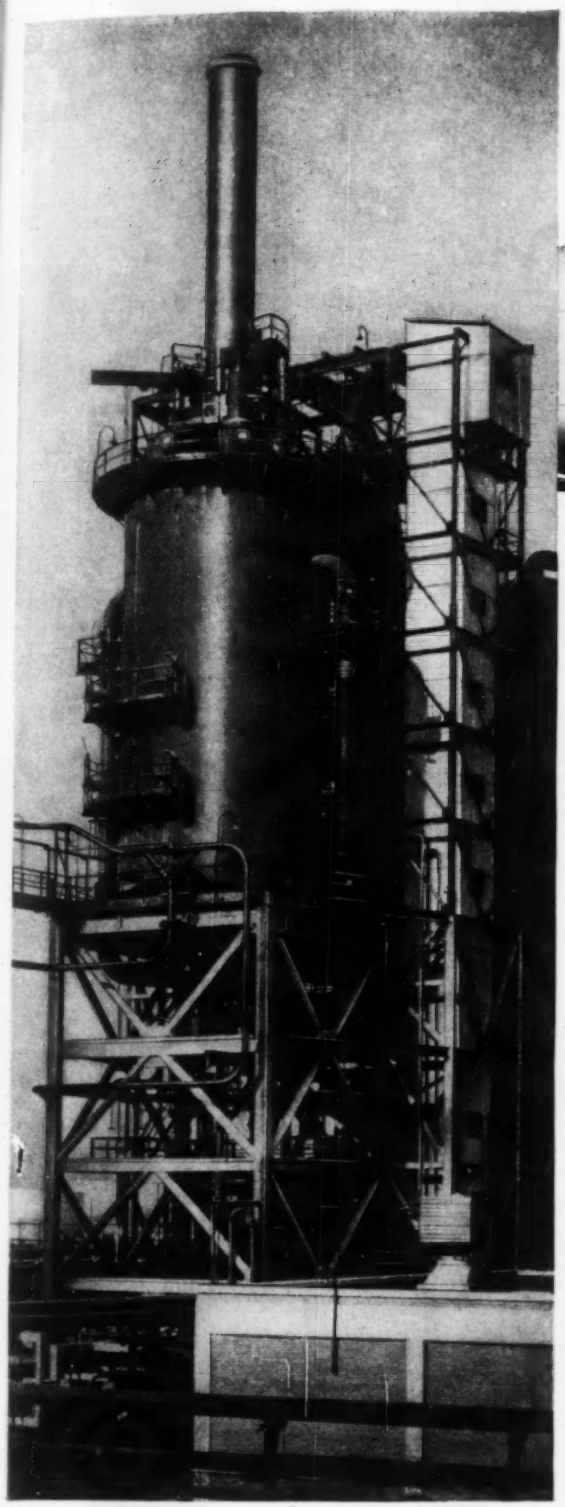
Entire unit may be base mounted at the factory or supplied with essential equipment for mounting. Units include a special heating element, designed to eliminate thermal breakdown or coking troubles.

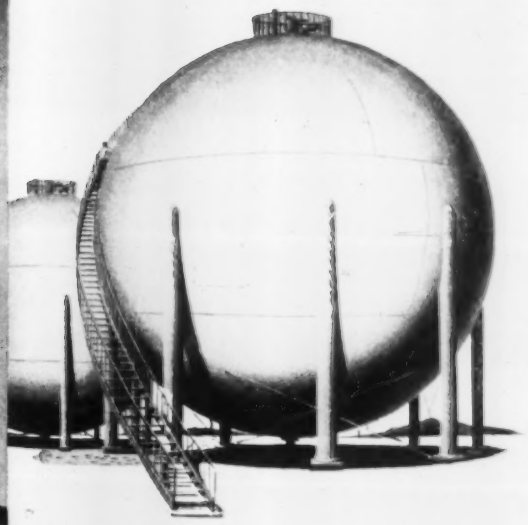
Check No. 12 on Reply Card for more Details

Bulk Handling Accessory

A power bucket accessory for the handling of bulk materials is available on all model Hi-Duty lift trucks

made by Transitier Truck Co., Portland, Oreg. Bucket has a capacity of 9 cubic feet and is constructed of high tensile steel with a special plow





. . . again
up steps progress
in petroleum

ACTIVITY No. 1 at Cities Service is to keep right up to *today*.

One of the most recent steps of Cities Service progress reaches skyhigh over East Chicago today. The Cities Service refinery there is now topped by a huge new unit of the latest type for catalytic refining. Improvements extend to the refinery's new gasolene treating equipment, gas purification unit, and gas recovery system. Many other modern structures, including the new "spheres" for storage of highly volatile hydrocarbons, all enter into that new look today at East Chicago.

There as elsewhere, progress by Cities Service results in products of excellence, and service to match. Consequently, users of petroleum products for industry, commercial transport, farming, and motoring can be sure of receiving top quality when ordering from Cities Service.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

steel lip. It features flared sides and lip to facilitate cleanup along walls and into corners.

Bucket action is controlled by hydraulically actuated cylinders, thus eliminating shock dumping. It can be opened or closed at any desired height up to 7 feet 10 inches on a 9-foot mast. It opens and closes through a full 90-degree arc. At present this unit is available only as original equipment on new trucks.

Check No. 13 on Reply Card for more Details

Anticorrosive Mechanical Seal

Type 9 mechanical shaft seal, developed by Crane Packing Co., Chicago 13, Ill., incorporates a flexible ring molded from Teflon, a plastic. The Teflon wedge-ring enables the seal to combine the chemically inert properties of the plastic with the flexibility and positive sealing components necessary for effective mechanical sealing. It can be used on various rotating shaft applications such as centrifugal pumps, turbines, positive displacement pumps and agitators.

Check No. 14 on Reply Card for more Details

Small Air Cylinder

Developed primarily for use in jig and fixture operations and for parts positioning and ejection, the Han-D-Air cylinder is announced by Bellows Co., Akron 9, O. It is a 1⅛-inch bore, 1-inch stroke, single acting, spring return device that can be mounted in practically any position. The 5/16-inch diameter piston rod has ½-inch of threaded end.

Check No. 15 on Reply Card for more Details

Tap for Heavy Duty Service

For heavy duty service connections for both inside and outside use, a new copper alloy service tap is offered by O. Z. Electrical Mfg. Co. Inc., Brooklyn, N. Y. To permit easy insertion of conductors, casting is designed to swivel. Serrations on both body and cap prevent cables from working loose after tap is installed. Tap is available in sizes from No. 2 to 1000 Mcm (Main) and No. 10 to 1000 Mcm (Tap).

Check No. 16 on Reply Card for more Details

Motor-Operated Type Breaker

Type AB breaker with an improved motor-operated mechanism for applications protecting critical electronic circuits is available from Westinghouse Electric Corp., Pittsburgh 30, Pa. Features of the 224 amp unit include a more positive adjustment of the motor mechanism, change in location of handle used for manual operation reducing overall height, motor mechanism can be removed from breaker and replaced without affecting relation between operating mechanism of motor and breaker.

Check No. 17 on Reply Card for more Details

Adjustable Boring Head

Mastur series 50 adjustable boring head is announced by Maxwell Co., Bedford, O. It is designed to handle both rough and finish operations on boring, milling and drilling machines as well as automatics. Tool block is dovetailed into the body and all fitting surfaces are ground to assure precision fit and long life. Head has a ⅜-inch capacity minimum with forged high speed steel bit and 7-inch capacity with alloy steel bar square bit.

Check No. 18 on Reply Card for more Details

Production Anodizing Basket

For production anodizing of rivets and other small parts, Belke Mfg. Co., Chicago 51, Ill., introduces an anodizing basket. Designed for use in sulphuric acid solutions, it is made of bakelite with an aluminum center stem. Cover is equipped with a compression spring for maintaining positive contact pressure.

Check No. 19 on Reply Card for more Details

Regulator for Speed Control

Waterman Engineering Co., Evanston, Ill., has developed an adjustable flow regulator for cylinder speed control. It gives a constant rate of flow regardless of pressure fluctuations or change in work resistance at any setting within the adjustable range. It is available for hydraulic systems with operating pressures to 3000 psi.

Check No. 20 on Reply Card for more Details

Electronic High Speed Recorder

An electronic high speed pen recorder for measuring rapidly changing variables experienced in laboratory and test applications is available from Minneapolis-Honeywell Regulator Co., Philadelphia, Pa. Full-scale signals which vary as rapidly as 20 cycles a minute can be recorded on this model; also those with peak-to-peak amplitude of 10 per cent of scale which vary as rapidly as three cycles a second.

Check No. 21 on Reply Card for more Details

Corrosion Resistant Pulleys

Corrosion resistant pulleys which will support loads up to 200 pounds are introduced by Thompson Electric Co., Cleveland 14, O. They can be utilized with cable, chain or rope ranging from ⅛ to ½-inch in diameter and are recommended for use with remote control liquid level indicators, fire door counterweights and other types of chain or rope operated equipment. Pulleys feature deeply grooved, molded composition wheel that is resistant to wear, acids, alkalies, oils and corrosive gases.

Check No. 22 on Reply Card for more Details

Diamond Abrasive Compound

Dymo-C, a new diamond abrasive compound prepared for sizing and polishing carbide wire drawing and heading dies has been developed by Industrial Products Division, Elgin National Watch Co., Elgin, Ill. Features include proper viscosity for convenient application, resistance to slinging and an inherent property of working down the lapping stick or pin to the actual work area.

Check No. 23 on Reply Card for more Details

Electric Hammer Line

Allied Tools Inc., Newark, N. J., announces the Kango electric hammer line. The heavy duty hammer is 22 inches long, weighs 21 pounds and strikes 1300 blows per minute. For drilling holes in concrete from ⅞ to 1½ inches, rawl drilling ⅜ to ⅝-inch diameter and medium cutting concrete, medium duty hammers are available. Light duty hammers are suitable for all types of overhead work, drilling holes ½ to ⅞-inch diameter, chase cutting for conduits in concrete, etc.

Check No. 24 on Reply Card for more Details

Transfer Buttons

For transferring blind unthreaded spring pocket holes in dies to new work quickly and accurately, Reid Tool Supply Co., Muskegon Heights, Mich., offers a new line of transfer buttons. Button can be fastened securely in hole to be transferred by tightening a socket set screw which forces a steel ball outward against the wall of the hole, locking button in place. Piece holding the transfer buttons is placed on the work in which holes are to be transferred, a sharp blow is struck and the true center is recorded.

Check No. 25 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Helpful Literature

76. Accumulators

Greer Hydraulics, Inc.—Illustrated and revised bulletin No. 301 describes construction and operation of hydropneumatic Accumulators and shows circuits demonstrating how they are used as auxiliary source of power, in closed systems for holding work, as volume compensators and for operating secondary circuits.

77. Air Valves

Ross Operating Valve Co.—44-page illustrated catalog describes hundreds of models and modifications of air valves. Data are given on straight-way, three-way, four-way and four-way five-port units in various sizes of hand, foot, solenoid, pilot, remote control, cam, speed control, shut-off, quick exhaust and miscellaneous types.

78. Carbide Bushings, Cylinders

Adamas Carbide Corp.—8-page illustrated bulletin B-151 includes gram weight tables, standard tolerances for unground pieces, extra charges for special forming operations and other data on bushings and solid cylinders of tungsten carbide. Information presented will enable user to estimate prices, determine most economical quantity and shape, and determine grinding stock.

79. Protective Packaging

Thilmany Pulp & Paper Co. — "There's Bounce That Counts" is title of 4-page illustrated bulletin which contains samples of Thilco crinkled papers for protective packaging of all types of products. In addition to being puncture resistant and moistureproof, this material stretches to form tight-fitting wrapping and protects products from damage or deterioration in handling or storage.

80. Measurements Laboratory

General Electric Co.—16-page illustrated bulletin GED-1406 describes varied facilities available and work conducted in new $2 million Measurements Laboratory of the G-E Meter and Instruments Divisions at Lynn, Mass. New ways to measure, development of new products, testing of equipment and evaluating of manufacturing processes are some of the projects covered.

81. Ship Unloader

Clyde Iron Works, Inc.—Details of the Clyde Unloader for high speed handling of bulk materials such as coal, ore and chemicals are described in 4-page illustrated circular MP-45. Coal handling capacities of two models are 300 and 600 tons per hour respectively with 3½ and 6 yd. buckets. Units are engineered for specific jobs.

82. Tramp Iron Removal

Eriez Mfg. Co.—16-page illustrated catalog 15 shows design and application of line of nonelectric permanent magnet separators for removal of tramp iron from materials in process. In addition to protecting machinery from damage, these units safeguard against fires and explosions caused by tramp iron.

83. Materials Handling Pallets

Arkansas Pallet Co.—Various types and sizes of Razorback wood pallets engineered for specific industrial materials handling operations are shown in 4-page illustrated bulletin "Pallets for Every Industrial Use." Construction details are explained.

84. Rotary Shears

Whiting Corp. Quickwork-Whiting Div.—8-page illustrated bulletin "Quickwork-Whiting Rotary Shears" covers machines which will cut straight lines, openings, odd shapes, narrow strips, bevels and circles in up to 1-in. thick mild steel. Heavy duty, medium service, light plate and sheet metal shears are described.

85. Metal Working Presses

American Steel Foundries, Elmes Engineering Div.—12-page illustrated bulletin No. 1010-B depicts and describes hydraulic metalworking presses. Presses feature electric control that provides semiautomatic or automatic operation and inching with speed change and reversal of slide governed either by ram travel or pressure.

86. Cut Wire Shot

Cleveland Metal Abrasive Co. — 4-page illustrated folder "Here's How 20th Century Cut-Wire Shot Cuts Costs on Cleaning and Peening" outlines advantages and savings accruing from use in shot blasting operations.

87. Drills & Tappers

Hamilton Tool Co.—Illustrated bulletin GL-349 gives specifications of sensitive production drilling and tapping machines designed to hold accuracy under any manufacturing conditions. Machines having horizontal work capacities to centers of 6½ to 16 in. and vertical capacities from 3½ to 10 in. are included.

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88. Two-Surface Grinder

Gardner Machine Co.—8-page illustrated publication "The Gardner Grinder" details results obtained from use of Gardner double disk precision grinder at Sundstrand Machine Tool Co. Parts finished by machine are shown and described.

89. Optical Parts

Bausch & Lomb Optical Co.—16-page illustrated catalog L-117 "Optical Parts" is intended to assist engineers and designers in incorporating standard optical parts into instruments and thereby avoiding higher cost of "tailor-made" optics. Lenses, prisms, reflectors, engraving and coating, and miscellaneous parts are covered, with focal length and specific catalog giving detailed information listed.

90. Recording Voltmeters

Bristol Co. — 28-page illustrated bulletin E1111 describes features of series 500 recording voltmeters and ammeters with special emphasis on recently-developed moving-iron measuring mechanism. Information is tabulated on ranges, sizes and specifications of various models for permanent and portable installations.

91. Fasteners

Cuyahoga Spring Co.—20-page illustrated catalog No. 46 explains how Snap-Clips aid split-second fastening of trim, moldings, tile, upholstery, carpet, tubing, wire, cables, panels and assemblies. Shown are numerous applications of this method of fastening.

92. Pipe Tool Operating Guide

Beaver Pipe Tools, Inc.—4-page illustrated "Operating Guide" tells how to locate and correct pipe and bolt machine and hand pipe tool troubles, plus telling users how to obtain best possible results from these machines and tools. Threading, cutting, reaming, operation of oil pump and 26 other operations are covered.

93. Snow Melting Systems

A. M. Byers Co.—36-page illustrated bulletin "Byers Wrought Iron Pipe for Snow Removal Systems" shows typical installations of pipe radiant heating systems in loading areas, ramps, sidewalks, driveways and other areas which remove snow by melting it. Layouts, installation procedures, engineering data and other information are included.

94. Speed Reducer

Dodge Mfg. Corp.—16-page illustrated bulletin A-470A "The New Torque-Arm Speed Reducer" describes this new device, lists its advantages and offers tables to aid in selection, taking into consideration service factors and type of driven load. Recommended V-belt drives for speed reducers are included.

95. Crawler Mounted Shovel

Bay City Shovels Inc.—20-page illustrated catalog No. 37-45A features heavy-duty design and construction of convertible ¾-yd series crawler mounted shovel, crane, dragline, clamshell and hoe. Machine can be used for excavating, erecting and materials handling.

96. Roof Inspection

Monroe Co. — Illustrated bulletin gives assistance in determining exact condition of building roofs and planning repairs. It explains how and why roofs deteriorate and indicates trouble spots where first danger signs appear. Patching, leak-stopping and resurfacing and renewing are covered in detail.

97. Thread Inserts

Heli-Coil Corp.—16-pape illustrated bulletin No. 650-R covers design data on helical-wire thread inserts and their use in protection and repair of tapped holes in aluminum, magnesium, plastics, iron, steel and wood. Tabular information includes recommended drill sizes, roughing and finishing-tap specifications and thread gages to be used when installing various types and sizes of inserts.

98. Brazing Alloys & Fluxes

All-State Welding Alloys Co.—4-page illustrated folder describes three packaged low-temperature brazing alloys and fluxes for intermittent work and infrequent jobs. Alloys, one of which contains 45 per cent silver, are available in tubes of transparent shatterproof plastic for ease of handling in maintenance kits.

99. Welding Design

Eutectic Welding Alloys Corp.—50-page illustrated "Manual of Welding Engineering and Design," third edition, contains recent information relative to joint preparation by electric arc, additional design data, comparative data and chemical welding aids developed within past year.

100. Abrasive Contact Wheel

Carborundum Co.—4-page illustrated folder "Banishes Belt Glazing" shows how new serrated rubber 61 contact wheel yields up to 50 per cent increased life to abrasive belts used for grinding and finishing operations. Serrations cause controlled breakdown in bond of coated abrasive belt to assure high stock removal rate.

FOR MORE INFORMATION USE ONE OF THESE CARDS . .

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18	38	58	78	98
19	39	59	79	99
20	40	60	80	100

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The Market Outlook

CONCERN over adequacy of future pig iron supplies for the merchant trade is increasing. This is giving rise to renewed talk of possible early application of formal allocations though no move has yet been taken in that direction. As of the moment, the outlook at some foundry centers is for growing pig iron stringency. To date, foundry operations, now averaging 45 hours weekly, have been sustained by judicious distribution on the part of iron suppliers, greater use of scrap and resort to imported metal. Whether formal government allocation would result in any better supply conditions in existing circumstances is questioned by many in the light of the generally successful distribution policy of pig iron producers since beginning of the emergency.

PROSPECTS—Whether supplies will continue adequate to support high-level foundry operations in the months ahead in the face of a general shortage of metallics is the big question of the moment. Right now the outlook for pig iron adequacy is darkened by the scheduled blowing out of a number of blast furnaces for needed repairs over coming weeks. Also, imports, which have been providing the foundries a decided supply lift over past months, are tending to dry up. Already some casting shops are on short iron rations. All of them are working on virtual hand-to-mouth metallics inventories, scrap also being in short supply. This latter is highly significant in view of the fact most foundries have been conserving pig iron by increased use of scrap.

CASTINGS DEMAND—Cutbacks in civilian durable goods and accompanying letdown in castings demand at best will only temporarily alter the pig iron supply situation. These production cuts are beginning to be reflected in some slight slackening of foundry activities, giving rise to the view that should civilian goods cutbacks come faster than new defense orders are received the pressure from the foundries for pig iron and other raw materials would lessen. On the other hand there are signs defense requirements will pick up rapidly from here on. In any event, it is pointed out the foundries are likely to continue to take in iron steadily, seeking to accumulate permitted inventories.

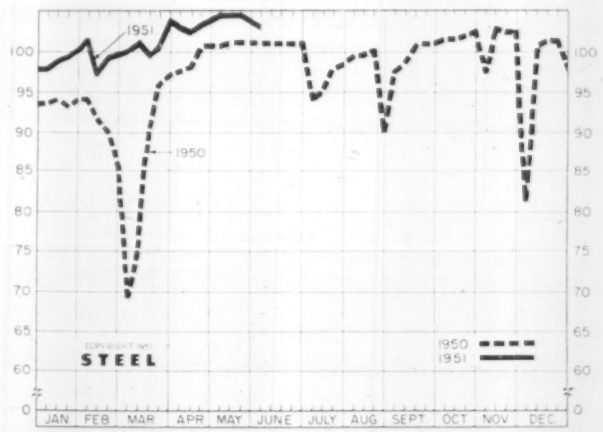
STEEL SUPPLY—Indications are third quarter will be the tightest period of steel supply for the civilian durable goods manufacturers. Increased set-asides for defense and defense-support programs will necessitate further cutbacks in quotas on civilian account for the period. Just how severe these supply cuts will be remains to be seen since schedules have not been completely set up even for July. Further, much depends on how distribution under the Controlled Materials Plan, which becomes effective July 1, works out. All of the signs point to further contraction in supplies for the general market, with some possible easing in conditions late this year.

CAPACITY—Another controversy appears to be shaping up between industry and government over the question of iron and steel expansion. Industry representatives hold the nation should have capacity for 118 million tons of steel ingots and 82.3 million tons of pig iron by July 1, 1953. Government men, however, are insisting 130 million tons of ingots and 95.3 million tons of pig iron will be required by that date. Trade authorities say the government goal is impracticable with steel set-asides for defense needs definitely restricting the tonnage available for facility expansion. On the other hand, the government view is strengthened by steel leaders' predictions supply-demand balance may be attained sooner than generally expected.

PRODUCTION—Mills maintained high-level operations through Memorial Day, the national ingot rate easing only ½ point to 103 per cent of capacity last week.

PRICES—Steel and related prices are firm at levels frozen by the government in January. STEEL's weighted index on finished steel holds at 171.92 as does the arithmetical composite at $106.32.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended June 2	Change	Same Week 1950	Same Week 1949
Pittsburgh	102	-5.5*	101.5	88
Chicago	106.5	-0.5*	103.5	99
Mid-Atlantic	101.5	0	98	86.5
Youngstown	105	0	106	103
Wheeling	98.5	-0.5	108	85
Cleveland	102.5	-1*	99	100
Buffalo	104	0	104	101.5
Birmingham	100	0	100	100
New England	85	-5	85	58
Cincinnati	104	0	104	90
St. Louis	98.5	-1	84.5	73.5
Detroit	106	0	104	85
Western	100.5	-3	95	84.5
Estimated national rate	103	-0.5	101	92

Based on weekly steelmaking capacity of 1,999,634 tons for 1951; 1,928,721 tons for second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949.
*Change from revised rate for preceding week.

The Metalworking Outlook—p. 51 Production-Engineering News—p. 87

Composite Market Averages

	May 31 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av. 100)	171.92	171.92	171.92	156.13	111.62
Index in cents per lb.	4.65¢	4.65¢	4.65¢	4.230¢	3.024¢
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$106.32	$106.32	$106.32	$84.23	$63.54
No. 2 Fdry. Pig Iron, GT	52.54	52.54	52.54	46.47	26.47
Basic Pig Iron, GT	52.16	52.16	52.16	45.97	25.50
Malleable Pig Iron, GT	53.27	53.27	53.27	47.27	26.79
Steelmaking Scrap, GT	44.00	44.00	44.00	35.50	19.17

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 18, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at *Pittsburgh, Bethlehem, Birmingham, Buffalo,* Chicago, Cleveland, Granite City, Youngstown. *Malleable* composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at *Pittsburgh,* Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	May 31 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	3.70	3.70	3.70	3.45	2.50
Bars, H.R., Chicago	3.70	3.70	3.70	3.45	2.50
Bars, H.R., del. Philadelphia	4.20	4.20	4.20	3.93	2.82
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.10-15	3.10
Shapes, Std., Pittsburgh	3.65	3.65	3.65	3.40	2.35
Shapes, Std., Chicago	3.65	3.65	3.65	3.40	2.35
Shapes, del. Philadelphia	3.91	3.91	3.91	3.46	2.465
Plates, Pittsburgh	3.70	3.70	3.70	3.50	2.50
Plates, Chicago	3.70	3.70	3.70	3.50	2.50
Plates, Coatesville, Pa.	4.15	4.15	4.15	3.60	2.60
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.50	2.50
Plates, Claymont, Del.	4.15	4.15	4.15	3.60	2.60
Sheets, H.R., Pittsburgh	3.60 75	3.60 75	3.60 75	3.35	2.425
Sheets, H.R., Chicago	3.60	3.60	3.60	3.35	2.425
Sheets, C.R., Pittsburgh	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Chicago	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Detroit	4.55	4.55	4.55	4.30	3.375
Sheets, Galv., Pittsburgh	4.80	4.80	4.80	4.40	4.05
Strip, H.R., Pittsburgh	3.75 4.00	3.75 4.00	3.75 4.00	3.25	2.35
Strip, H.R., Chicago	3.50	3.50	3.50	3.25	2.35
Strip, C.R., Pittsburgh	4.65 5.35	4.65 5.35	4.65 5.35	4.15	3.05
Strip, C.R., Chicago	4.90	4.90	4.90	4.30	3.15
Strip, C.R., Detroit	4.35 5.60	4.35 5.60	4.35 5.60	4.35 40	3.15
Wire, Basic, Pittsburgh	4.85-5.10	4.85-5.10	4.85-5.10	4.50	3.05
Nails, Wire, Pittsburgh	5.90 6.20	5.90 6.20	5.90 6.20	5.30	3.25
Tin plate, box, Pittsburgh	$8.70	$8.70	$8.70	$7.50	$5.25

SEMIFINISHED

Billets, forging, Pitts. (NT)	$66.00	$66.00	$66.00	$63.00	$47.00
Wire rods, ½-⅝", Pitts.	4.10-30	4.10-30	4.10-30	3.85	2.30

PIG IRON, Gross Ton

Bessemer, Pitts.	$53.00	$53.00	$53.00	$47.00	$27.00
Basic Valley	52.00	52.00	52.00	46.00	26.00
Basic, del. Phila.	56.19	56.19	56.19	49.44	27.84
No. 2 Fdry, Pitts.	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry, Chicago	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry, Valley	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry, Del. Phila.	56.99	56.99	56.99	49.94	28.34
No. 2 Fdry, Birm.	48.88	48.88	48.88	42.38	22.88
No. 2 Fdry (Birm.) del. Cin.	55.33	55.33	55.33	49.08	26.94
Malleable Valley	52.50	52.50	52.50	46.50	26.50
Malleable, Chicago	52.50	52.50	52.50	46.50	26.50
Charcoal, Lyles, Tenn.	66.00	66.00	66.00	60.00	33.00
Ferromanganese, Etna, Pa.	188.00	188.00	188.00	175.00	140.00*

* Delivered, Pittsburgh.

SCRAP, Gross Ton (including broker's commission)

No. 1 Heavy Melt, Pitts.	$45.00	$45.00	$45.00	$42.50	$20.00
No. 1 Heavy Melt, E. Pa.	43.50	43.50	43.50	32.50	18.75
No. 1 Heavy Melt, Chicago	43.50	43.50	43.50	36.50	18.75
No. 1 Heavy Melt, Valley	45.00	45.00	45.00	44.75	20.00
No. 1 Heavy Melt, Cleve.	44.00	44.00	44.00	42.75	19.50
No. 1 Heavy Melt, Buffalo	44.00	44.00	44.00	36.75	19.25
Rails, Rerolling, Chicago	52.50	52.50	52.50	52.50	22.25
No. 1 Cast, Chicago	49.00*	49.00*	49.00*	48.50	20.00

* F. o.b. shipping point.

COKE, Net Ton

Beehive, Furn. Connlsvl.	$14.75	$14.75	$14.75	$14.25	$7.50
Beehive, Fdry. Connlsvl.	17.50	17.50	17.50	15.50	8.25
Oven Fdry., Chicago	21.00	21.00	21.00	21.00	13.00

NONFERROUS METALS

Copper, del. Conn.	24.50	24.50	24.50	20.50	12.00
Zinc, E. St. Louis	17.50	17.50	17.50	13.00	8.25
Lead, St. Louis	16.80	16.80	16.80	11.80	6.35
Tin, New York	139.00	139.00	142.00	78.00	52.00
Aluminum, del.	19.00	19.00	19.00	17.50	15.00
Antimony, Laredo, Tex.	42.00	42.00	42.00	24.50	14.50
Nickel, refinery, duty paid.	50.50	50.50	50.50	48.00	35.00

Pig Iron

F.o.b. furnace prices quoted under GCPR as reported to STEEL. Minimum delivered prices do not include 3% federal tax. Key to producing companies published on second following page.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$54.00	$54.50	$55.00	$55.50
Brooklyn,N.Y.,del.	....	58.69	59.46	....
Newark,del.	56.74	57.24	57.74	58.24
Philadelphia,del.	56.49	56.99	57.49	57.99
Birmingham District				
AlabamaCity,Ala. R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward,Ala. W15	48.38	48.88	....	....
Cincinnati,del.	....	55.33	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda,N.Y. W12	52.00	52.50	53.00	....
No.Tonawanda,N.Y. T9	....	52.50	53.00	....
Boston,del.	61.63	62.13	62.63	....
Rochester,N.Y.,del.	54.74	55.24	55.74	....
Syracuse,N.Y.,del.	55.72	56.22	56.72	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary,Ind. U5	52.00	....	52.50	....
IndianaHarbor,Ind. I-2	52.00	....	52.50	....
So.Chicago,Ill. W14	52.00	52.50	52.50	....
So.Chicago,Ill. Y1	52.00	52.50	53.00	....
So.Chicago,Ill. U5	52.00	....	52.50	53.00
Milwaukee,del.	54.97	54.47	54.47	54.97
Muskegon,Mich.,del.	....	58.20	58.20	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, del. from Cleve.	54.49	54.99	54.99	55.49
Lorain,O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie,Pa. E-3	52.00	52.50	52.50	53.00
Everett,Mass. E1	....	51.75	52.25	....
Fontana,Calif. K1	58.00	58.50	....	....
Geneva,Utah G1	52.00	52.50	....	....
Seattle,Tacoma,Wash.,del.	....	60.35	....	....
Portland,Oreg.,del.	....	60.35	....	....
LosAngeles,SanFrancisco,del.	56.85	60.35	....	....
GraniteCity,Ill. G4	53.90	54.40	54.90	....
St.Louis,del. (inc. tax)	54.66	55.16	55.66	....
Ironton,Utah C11	52.00	52.50	....	....
LoneStar, Tex. L6	48.00	48.50	48.50	....
Minnequa,Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
NevilleIsland,Pa. P6	....	52.50	52.50	53.00
Pitts.,N.&S. sides, Ambridge, Aliquippa,del.	....	53.74	53.74	54.24
McKeesRocks, del.	....	53.49	53.49	53.99
Lawrenceville, Homestead, McKeesport,Monaca,del.	....	54.00	54.00	54.50
Verona,del.	....	54.48	54.48	54.98
Brackenridge,del.	....	54.72	54.72	55.22
Bessemer,Pa. U5	52.00	....	52.50	53.00
Clairton,Rankin,So.Duquesne,Pa. U5	52.00	....	....	....
McKeesport,Pa. N3	52.00	....	....	53.00
Monnessen,Pa. P7	54.00	....	....	....
Sharpsville,Pa. S6	....	....	52.50	53.00
Steelton,Pa. B2	54.00	54.50	55.00	55.50
Swedeland,Pa. A3	56.00	56.50	57.00	57.50
Toledo,O. I-3	52.00	52.50	52.50	53.00
Cincinnati,del.	57.21	57.71	....	....
Troy,N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard,O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Youngstown U5	52.00	....	....	53.00
Mansfield,O.,del.	56.43	56.93	56.93	57.43

*Low phos, southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade; 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson,O. G2, J1	$62.50
Buffalo H1	63.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

NiagaraFalls,N.Y. P15	$83.00
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2	92.50
Keokuk, OH & Fdry., 12½ lb piglets, 16% Si, frt. allowed K2	95.50
Wenatchee, Wash., O.H. & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 x 6)

Lyles,Tenn. T3	$66.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.00
Steelton,Pa. B2	60.00
Philadelphia delivered	63.12
Troy,N.Y. R2	60.00

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Semifinished and Finished Steel Products

Base prices quoted under GCPR as reported to STEEL, May 31, 1951; cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)

Fontana, Calif. K1 ... $78.00
Munhall, Pa. U5 ... 52.00

INGOTS, Alloy (NT)

Detroit R7 ... $54.00
Fontana, Calif. K1 ... 80.00
Houston, Tex. S5 ... 62.00
Midland, Pa. C18 ... 54.00
Munhall, Pa. U5 ... 54.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)

Bessemer, Pa. U5 ... $56.00
Clairton, Pa. U5 ... 56.00
Ensley, Ala. T2 ... 56.00
Fairfield, Ala. T2 ... 56.00
Fontana, Calif. K1 ... 56.00
Gary, Ind. U5 ... 56.00
Johnstown, Pa. B2 ... 56.00
Lackawanna, N.Y. B2 ... 56.00
Munhall, Pa. U5 ... 56.00
So. Chicago, Ill. U5 ... 56.00
So. Duquesne, Pa. U5 ... 56.00

Carbon, Forging (NT)

Bessemer, Pa. U5 ... $66.00
Buffalo R2 ... 66.00
Canton, O. R2 ... 66.00
Clairton, Pa. U5 ... 66.00
Cleveland R2 ... 66.00
Conshohocken, Pa. A3 ... 73.00
Detroit R7 ... 69.00
Ensley, Ala. T2 ... 66.00
Fairfield, Ala. T2 ... 66.00
Fontana, Calif. K1 ... 85.00
Gary, Ind. U5 ... 66.00
Geneva, Utah G1 ... 66.00
Houston, Tex. S5 ... 74.00
Johnstown, Pa. B2 ... 66.00
Lackawanna, N.Y. B2 ... 66.00
Los Angeles B3 ... 85.00
Munhall, Pa. U5 ... 66.00
Seattle B3 ... 85.00
So. Chicago R2, U5, W14 ... 66.00
So. Duquesne, Pa. U5 ... 66.00
So. San Francisco B3 ... 85.00

Alloy, Forging (NT)

Bethlehem, Pa. B2 ... $70.00
Buffalo R2 ... 70.00
Canton, O. R2 ... 70.00
Canton, O. (29) T7 ... 66.00
Conshohocken, Pa. A3 ... 77.00
Detroit R7 ... 73.00
Fontana, Calif. K1 ... 89.00
Gary, Ind. U5 ... 70.00
Houston, Tex. S5 ... 78.00
Ind. Harbor, Ind. Y1 ... 70.00
Johnstown, Pa. B2 ... 70.00
Lackawanna, N.Y. B2 ... 70.00
Los Angeles B3 ... 90.00
Massillon, O. R2 ... 70.00
Midland, Pa. C18 ... 70.00
Munhall, Pa. U5 ... 70.00
So. Chicago R2, U5, W14 ... 70.00
So. Duquesne, Pa. U5 ... 70.00
Struthers, O. Y1 ... 70.00
Warren, O. C17 ... 70.00

ROUNDS, SEAMLESS TUBE (NT)

Canton, O. R2 ... $82.00
Cleveland R2 ... 82.00
Fontana, Calif. K1 ... 103.00
Gary, Ind. U5 ... 82.00
Massillon, O. R2 ... 82.00
So. Chicago, Ill. R2 ... 82.00
So. Duquesne, Pa. U5 ... 82.00

SHEET BARS (NT)

Fontana, Calif. K1 ... $89.00

SKELP

Aliquippa, Pa. J5 ... 3.45
Munhall, Pa. U5 ... 3.35
Warren, O. R2 ... 3.35
Youngstown R2, U5 ... 3.35

WIRE RODS

Alabama City, Ala. R2 ... 4.10
Buffalo W12 ... 4.10
Cleveland A7 ... 4.10
Donora, Pa. A7 ... 4.10
Fairfield, Ala. T2 ... 4.10
Fontana, Calif. K1 ... 4.90
Houston, Tex. S5 ... 4.50
Johnstown, Pa. B2 ... 4.10
Joliet, Ill. A7 ... 4.10
Los Angeles B3 ... 4.90
Minnequa, Colo. C10 ... 4.35
Monessen, Pa. P7 ... 4.30
No. Tonawanda, N.Y. B11 ... 4.10
Pittsburg, Calif. C11 ... 4.75
Portsmouth, O. P12 ... 4.30
Roebling, N.J. R5 ... 4.20
So. Chicago, Ill. R2 ... 4.10
Sparrows Point, Md. B2 ... 4.20
Sterling, Ill. (1) N15 ... 4.10
Struthers, O. Y1 ... 4.10
Torrance, Calif. C11 ... 4.90
Worcester A7 ... 4.40

PLATES, Wrought Iron

Economy, Pa. B14 ... 8.60

STRUCTURALS
Carbon Steel Stand. Shapes

Alabama City, Ala. R2 ... 3.60
Aliquippa, Pa. J5 ... 3.65
Bessemer, Ala. T2 ... 3.65
Bethlehem, Pa. B2 ... 3.70
Clairton, Pa. U5 ... 3.65
Fairfield, Ala. T2 ... 3.65
Fontana, Calif. K1 ... 4.25
Gary, Ind. U5 ... 3.65
Geneva, Utah G1 ... 3.65
Houston, Tex. S5 ... 4.05
Ind. Harbor, Ind. I-2 ... 3.65
Johnstown, Pa. B2 ... 3.70
Kansas City, Mo. S5 ... 4.25
Lackawanna, N.Y. B2 ... 3.70
Los Angeles B3 ... 4.25
Minnequa, Colo. C10 ... 4.10
Munhall, Pa. U5 ... 3.65
Niles, Calif. (22) P1 ... 4.85
Phoenixville, Pa. P4 ... 4.95
Portland, Oreg. O4 ... 4.50
Seattle B3 ... 4.30
So. Chicago, Ill. U5, W14 ... 3.65
So. San Francisco B3 ... 4.20
Torrance, Calif. C11 ... 4.25
Weirton, W.Va. W6 ... 3.90

Alloy Stand. Shapes

Clairton, Pa. U5 ... 4.35
Fontana, Calif. K1 ... 5.55
Munhall, Pa. U5 ... 4.35
So. Chicago, Ill. U5 ... 4.35

H.S., L.A. Stand. Shapes

Aliquippa, Pa. J5 ... 5.50
Bessemer, Ala. T2 ... 5.50
Bethlehem, Pa. (14) B2 ... 5.50
Clairton, Pa. U5 ... 5.50
Fairfield, Ala. T2 ... 5.50
Fontana, Calif. K1 ... 6.10
Gary, Ind. U5 ... 5.50
Geneva, Utah G1 ... 5.50
Ind. Harbor, Ind. I-2 ... 5.50
Ind. Harbor, Ind. Y1 ... 6.00
Johnstown, Pa. B2 ... 5.50
Lackawanna, N.Y. (14) B2 ... 5.50
Los Angeles B3 ... 6.05
Munhall, Pa. U5 ... 5.50
Seattle B3 ... 6.10
So. Chicago, Ill. U5 ... 5.50
So. San Francisco B3 ... 6.00
Struthers, O. Y1 ... 6.00

Wide Flange

Bethlehem, Pa. B2 ... 3.70
Clairton, Pa. U5 ... 3.65
Fontana, Calif. K1 ... 4.65
Lackawanna, N.Y. B2 ... 3.70
Munhall, Pa. U5 ... 3.65
So. Chicago, Ill. U5 ... 3.65

H.S., L.A. Wide Flange

Bethlehem, Pa. B2 ... 5.50
Lackawanna, N.Y. B2 ... 5.50
Munhall, Pa. U5 ... 5.45
So. Chicago, Ill. U5 ... 5.45

SHEET STEEL PILING

Ind. Harbor, Ind. I-2 ... 4.45
Lackawanna, N.Y. B2 ... 4.45
Munhall, Pa. U5 ... 4.45
So. Chicago, Ill. U5 ... 4.45

BEARING PILES

Munhall, Pa. U5 ... 3.65
So. Chicago, Ill. U5 ... 3.65

PLATES, High-Strength Low-Alloy

Aliquippa, Pa. J5 ... 5.65
Bessemer, Ala. T2 ... 5.65
Clairton, Pa. U5 ... 5.65
Cleveland J5, R2 ... 5.65
Conshohocken, Pa. A3 ... 5.90
Fairfield, Ala. T2 ... 5.65
Fontana, Calif. (30) K1 ... 6.25
Gary, Ind. U5 ... 5.65
Geneva, Utah G1 ... 5.65
Ind. Harbor, Ind. I-2 ... 5.65
Ind. Harbor, Ind. Y1 ... 6.15
Johnstown, Pa. B2 ... 5.65
Munhall, Pa. U5 ... 5.65
Pittsburgh J5 ... 5.65
Seattle B3 ... 6.55
Sharon, Pa. S3 ... 5.70
So. Chicago, Ill. U5 ... 5.65
Sparrows Point, Md. B2 ... 5.65
Warren, O. R2 ... 5.65
Youngstown Y1 ... 6.15

PLATES, Open-Hearth Alloy

Claymont, Del. C22 ... 4.85
Coatesville, Pa. L7 ... 5.25
Conshohocken, Pa. A3 ... 5.05
Fontana, Calif. K1 ... 5.70
Gary, Ind. U5 ... 4.75
Johnstown, Pa. B2 ... 4.75
Munhall, Pa. U5 ... 4.75
Sharon, Pa. S3 ... 5.20
So. Chicago, Ill. U5 ... 4.75
Sparrows Point, Md. B2 ... 4.75

FLOOR PLATES

Cleveland J5 ... 4.75
Conshohocken, Pa. A3 ... 4.75
Harrisburg, Pa. C5 ... 5.95
Ind. Harbor, Ind. I-2 ... 4.75
Munhall, Pa. U5 ... 4.75
So. Chicago, Ill. U5 ... 4.75

PLATES, Carbon Steel

Alabama City, Ala. R2 ... 3.70
Aliquippa, Pa. J5 ... 3.70
Ashland, Ky (15) A10 ... 3.70
Bessemer, Ala. T2 ... 3.70
Clairton, Pa. U5 ... 3.70
Claymont, Del. C22 ... 4.15
Cleveland J5, R2 ... 3.70
Coatesville, Pa. L7 ... 4.15
Conshohocken, Pa. A3 ... 4.15
Fairfield, Ala. T2 ... 3.70
Fontana, Calif. (30) K1 ... 4.30
Gary, Ind. U5 ... 3.70
Granite City, Ill. G4 ... 4.40
Geneva, Utah G1 ... 3.70
Harrisburg, Pa. C5 ... 4.95
Houston, Tex. S5 ... 4.10
Ind. Harbor, Ind. I-2, Y1 ... 3.70
Johnstown, Pa. B2 ... 3.70
Lackawanna, N.Y. B2 ... 3.70
Minnequa, Colo. C10 ... 4.50
Munhall, Pa. U5 ... 3.70
Pittsburgh J5 ... 3.70
Seattle B3 ... 4.60
Sharon, Pa. S3 ... 3.95
So. Chicago, Ill. U5, W14 ... 3.70
Sparrows Point, Md. B2 ... 3.70
Steubenville, O. W10 ... 3.70
Warren, O. R2 ... 3.70
Weirton, W.Va. W6 ... 4.00
Youngstown R2, U5, Y1 ... 3.70

PLATES, Carbon A. R.

Fontana, Calif. K1 ... 5.45
Geneva, Utah G1 ... 4.85

PLATES, Ingot Iron

Ashland, c.l. (15) A10 ... 3.95
Ashland, lcl (15) A10 ... 4.45
Cleveland, c.l. R2 ... 4.30
Warren, O. c.l. R2 ... 4.30

BARS, Hot-Rolled Carbon

Alabama City, Ala. R2 ... 3.70
Aliquippa, Pa. J5 ... 3.70
Alton, Ill. (1) L1 ... 3.95
Atlanta, Ga. A11 ... 4.25
Bessemer, Ala. T2 ... 3.70
Buffalo R2 ... 3.70
Canton, O. R2 ... 3.70
Clairton, Pa. U5 ... 3.70
Cleveland R2 ... 3.70
Detroit R7 ... 3.85
Emeryville, Calif. J7 ... 4.45
Fairfield, Ala. T2 ... 3.70
Fontana, Calif. K1 ... 4.40
Gary, Ind. U5 ... 3.70
Houston, Tex. S5 ... 4.10
Ind. Harbor, Ind. I-2, Y1 ... 3.70
Johnstown, Pa. B2 ... 3.70
Kansas City, Mo. S5 ... 4.30
Lackawanna, N.Y. B2 ... 3.70
Los Angeles B3 ... 4.40
Milton, Pa. B6 ... 4.20
Minnequa, Colo. C10 ... 4.15
Niles, Calif. P1 ... 5.05
N. Tonawanda, N.Y. B11 ... 3.70
Pittsburg, Calif. C11 ... 4.40
Pittsburgh J5 ... 3.70
Portland, Oreg. O4 ... 4.65
Seattle B3, N14 ... 4.45
So. Chicago R2, U5, W14 ... 3.70
So. Duquesne, Pa. U5 ... 3.70
So. San Fran., Cal. B3 ... 4.45
Struthers, O. Y1 ... 3.70
Torrance, Calif. C11 ... 4.40
Weirton, W. Va. W6 ... 3.85
Youngstown R2, U5 ... 3.70

BAR SIZE ANGLES; S. SHAPES

Aliquippa, Pa. J5 ... 3.70
Atlanta A11 ... 4.25
Johnstown, Pa. B2 ... 3.70
Lackawanna, N.Y. B2 ... 3.70
Niles, Calif. P1 ... 5.05
Portland, Oreg. O4 ... 4.65
San Francisco S7 ... 4.85

BAR SIZE ANGLES; H.R. CARBON

Bethlehem, Pa. B2 ... 3.90

BARS, Hot-Rolled Alloy

Bethlehem, Pa. B2 ... 4.30
Buffalo R2 ... 4.30
Canton, O. R2 ... 4.30
Canton, O. (29) T7 ... 3.95
Clairton, Pa. U5 ... 4.30
Detroit R7 ... 4.45
Ecorse, Mich. G5 ... 4.65
Fontana, Calif. K1 ... 5.35
Gary, Ind. U5 ... 4.30
Houston, Tex. S5 ... 4.70
Ind. Harbor, Ind. I-2, Y1 ... 4.30
Johnstown, Pa. B2 ... 4.30
Kansas City, Mo. S5 ... 4.90
Lackawanna, N.Y. B2 ... 4.30
Los Angeles B3 ... 5.35
Massillon, O. R2 ... 4.30
Midland, Pa. C18 ... 4.30
So. Chicago R2, U5, W14 ... 4.30
So. Duquesne, Pa. U5 ... 4.30
Struthers, O. Y1 ... 4.30
Warren, O. C17 ... 4.30
Youngstown U5 ... 4.30

BAR SHAPES, Hot-Rolled Alloy

Clairton, Pa. U5 ... 4.55
Gary, Ind. U5 ... 4.55
Youngstown U5 ... 4.55

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy

Aliquippa, Pa. J5 ... 5.55
Bessemer, Ala. T2 ... 5.55
Bethlehem, Pa. B2 ... 5.55
Clairton, Pa. U5 ... 5.55
Cleveland R2 ... 5.55
Fairfield, Ala. T2 ... 5.55
Fontana, Calif. K1 ... 6.60
Gary, Ind. U5 ... 5.55
Ind. Harbor, Ind. I-2 ... 5.55
Indiana Harbor, Ind. Y1 ... 6.05
Johnstown, Pa. B2 ... 5.55
Lackawanna, N.Y. B2 ... 5.55
Los Angeles B3 ... 6.25
Pittsburgh J5 ... 5.55
Seattle B3 ... 6.30
So. Duquesne, Pa. U5 ... 5.55
So. San Francisco B3 ... 6.30
Struthers, O. Y1 ... 6.05
Youngstown U5 ... 5.55

BARS, Cold-Finished Carbon

Ambridge, Pa. W18 ... 4.55
Beaver Falls, Pa. M12, R2 ... 4.55
Buffalo B5 ... 4.60
Camden, N.J. P13 ... 5.00
Carnegie, Pa. C12 ... 4.55
Chicago W18 ... 4.55
Cleveland A7, C20 ... 4.55
Detroit P17 ... 4.70
Donora, Pa. A7 ... 4.55
Elyria, O. W8 ... 4.55
Franklin Park, Ill. N5 ... 4.55
Gary, Ind. R2 ... 4.55
Green Bay, Wis. F7 ... 4.55
Hammond, Ind. L2, M13 ... 4.55
Hartford, Conn. R2 ... 5.10
Harvey, Ill. B5 ... 4.55
Los Angeles R2 ... 6.00
Mansfield, Mass. B5 ... 5.10
Massillon, O. R2, R8 ... 4.55
Monaca, Pa. S17 ... 4.55
Newark, N.J. W18 ... 5.00
Plymouth, Mich. P5 ... 4.80
Pittsburgh J5 ... 4.55
Putnam, Conn. W18 ... 5.10
Readville, Mass. C14 ... 5.10
St. Louis, Mo. M5 ... 4.95
So. Chicago, Ill. W14 ... 4.55
Spring City, Pa. (5) K3 ... 5.00
Struthers, O. Y1 ... 4.55
Waukegan, Ill. A7 ... 4.55
Youngstown F3, Y1 ... 4.55

BARS, Cold-Finished Alloy

Ambridge, Pa. W18 ... 5.40
Beaver Falls, Pa. M12 ... 5.40
Bethlehem, Pa. B2 ... 5.40
Buffalo B5 ... 5.40
Camden, N.J. P13 ... 5.80
Canton, O. R2 ... 5.40
Canton, O. (29) T7 ... 4.90
Carnegie, Pa. C12 ... 5.40
Chicago W18 ... 5.40
Cleveland A7 ... 5.45
Cleveland C20 ... 5.40
Detroit P17 ... 5.55
Donora, Pa. A7 ... 5.45
Elyria, O. W8 ... 5.40
Gary, Ind. R2 ... 5.40
Hammond, Ind. L2, M13 ... 5.40
Hartford, Conn. R2 ... 5.85
Harvey, Ill. B5 ... 5.40
Lackawanna, N.Y. B2 ... 5.40
Mansfield, Mass. B5 ... 5.85
Massillon, O. R2, R8 ... 5.40
Midland, Pa. C18 ... 5.40
Monaca, Pa. S17 ... 5.40
Newark, N.J. W18 ... 5.75
Plymouth, Mich. P5 ... 5.60
So. Chicago, Ill. R2, W14 ... 5.40
Struthers, O. Y1 ... 5.40
Warren, O. C17 ... 5.40
Waukegan, Ill. A7 ... 5.45
Worcester, Mass. A7 ... 5.75
Youngstown F3, Y1 ... 5.40

RAIL STEEL BARS

Chicago Hts. (3, 4) I-2, C2 ... 4.75
Franklin, Pa. (3, 4) F5 ... 4.75
Fort Worth, Tex. (26) T4 ... 4.85
Huntingtn, W.Va. (3) W7 ... 5.50
Marion, O. (3) P11 ... 4.75
Moline, Ill. (3) R2 ... 3.80
Tonawanda (3, 4) B12 ... 4.75
Williamsport (3) S19 ... 5.00
Williamsport (4) S19 ... 5.10

BARS, Wrought Iron

Dover, N.J. (Staybolt) U1 ... 15.00
Dover, (Eng. Bolt) U1 ... 13.50
Dover (Wrgt. Iron) U1 ... 12.25
Economy, Pa. (S.R.) B14 ... 9.60
Economy, Pa. (D.R.) B14 ... 11.90
Economy, (Staybolt) B14 ... 12.20
McK. Rks. (Staybolt) L5 ... 14.50
McK. Rks. (S.R.) L5 ... 9.60
McK. Rks. (D.R.) L5 ... 13.00

BARS, Reinforcing (Fabricators)

Alabama City, Ala. R2 ... 3.70
Alton, Ill. (6) L1 ... 3.70
Atlanta A11 ... 4.25
Buffalo R2 ... 3.70
Cleveland R2 ... 3.70
Emeryville, Calif. J7 ... 4.45
Fairfield, Ala. T2 ... 3.70
Fontana, Calif. K1 ... 4.40
Gary, Ind. U5 ... 3.70
Houston, Tex. S5 ... 4.10
Ind. Harbor, Ind. I-2, Y1 ... 3.70
Johnstown, Pa. B2 ... 3.70
Kansas City, Mo. S5 ... 4.30
Lackawanna, N.Y. B2 ... 3.70
Los Angeles B3 ... 4.40
Milton, Pa. B6 ... 4.20
Minnequa, Colo. C10 ... 4.50
Niles, Calif. P1 ... 5.05
Pittsburg, Calif. C11 ... 4.40
Pittsburgh J5 ... 3.70
Sharon, Pa. S3 ... 4.00
So. Chicago, Ill. W14 ... 3.60
Sparrows Point, Md. B2 ... 3.60
Steubenville, O. W10 ... 3.60
Torrance, Calif. C11 ... 4.30
Warren, O. R2 ... 3.60
Weirton, W.Va. W6 ... 3.60
West Leechburg, Pa. A4 ... 3.75
Youngstown U5, Y1 ... 3.60

SHEETS, H.R., (19 gage)

Alabama City, Ala. R2 ... 4.75
Dover, O. R1 ... 5.65
Ind. Harbor, Ind. I-2 ... 5.40
Mansfield, O. E6 ... 5.65
Niles, O. N12 ... 5.75
Torrance, Calif. C11 ... 5.40

SHEETS, H.R. (14-ga., heavier) High-Strength Low-Alloy

Cleveland J5, R2 ... 5.40
Conshohocken, Pa. A3 ... 5.65
Ecorse, Mich. G5 ... 5.95
Fairfield, Ala. T2 ... 5.40
Fontana, Calif. K1 ... 6.35
Gary, Ind. U5 ... 5.40
Ind. Harbor, Ind. I-2 ... 5.40
Indiana Harbor, Ind. Y1 ... 5.90
Irvin, Pa. U5 ... 5.40
Lackawanna (35) B2 ... 5.40
Pittsburgh J5 ... 5.40
Sharon, Pa. S3 ... 5.40
So. Chicago, Ill. U5 ... 5.40
Sparrows Point (36) B2 ... 5.40
Warren, O. R2 ... 5.40
Weirton, W.Va. W6 ... 5.75
Youngstown U5 ... 5.40
Youngstown Y1 ... 5.90

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland J5, R2 ... 6.55
Ecorse, Mich. G5 ... 7.10
Fontana, Calif. K1 ... 7.50
Gary, Ind. U5 ... 6.55
Indiana Harbor, Ind. Y1 ... 7.05
Indiana Harbor, Ind. I-2, ... 6.55
Irvin, Pa. U5 ... 6.55
Lackawanna (37) B2 ... 6.55
Pittsburgh J5 ... 6.55
Sparrows Point (38) B2 ... 6.55
Warren, O. R2 ... 6.55
Weirton, W.Va. W6 ... 6.90
Youngstown Y1 ... 7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.35
Cleveland J5, R2	4.35
Ecorse,Mich. G5	4.55
Fairfield,Ala. T2	4.35
Follansbee,W.Va. F4	5.35
Fontana, Calif. K1	5.30
Gary,Ind. U5	4.35
GraniteCity,Ill. G4	5.05
Ind.Harbor,Ind. I-2, Y1	4.35
Irvin,Pa. U5	4.35
Lackawanna,N.Y. B2	4.35
Middletown,O. A10	4.35
Pittsburg,Calif. C11	5.30
Pittsburgh J5	4.35
SparrowsPoint,Md. B2	4.35
Steubenville,O. W10	4.35
Warren,O. R2	4.35
Weirton,W.Va. W6	4.35
Youngstown Y1	4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala. R2	4.80
Ashland,Ky.(8) A10	4.80
Canton,O. R2	4.80
Dover,O. R1	5.50
Fairfield,Ala. T2	4.80
Gary,Ind. U5	4.80
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. I-2	4.80
Irvin,Pa. U5	4.80
Kokomo,Ind.(13) C16	5.20
MartinsFerry,O. W10	4.80
Niles,O. N12	6.00
Pittsburg,Calif. C11	5.55
SparrowsPoint,Md. B2	4.80
Steubenville,O. W10	4.80
Torrance,Calif. C11	5.55
Weirton,W.Va. W6	4.80

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. U5	7.20
SparrowsPoint(39) B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	5.35
Irvin,Pa. U5	5.35
Kokomo,Ind.(13) C16	5.75
Niles,O. N12	6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	5.05
Middletown,O. A10	5.05

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.65
Niles,O. R2 (28)	5.65
Weirton,W.Va. W6	5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.70

SHEETS, Drum Body

Pittsburg,Calif. C11	4.30
Torrance,Calif. C11	4.30

SHEETS, Well Casing

Fontana,Calif. K1	5.10
Torrance,Calif. C11	5.10

BLUED Stock, 29 Ga.

Yorkville,O. W10	6.80
Follansbee,W.Va.(23) F4	6.85

ROOFING SHORT TERNES (8 lb. coated)

Gary,Ind. U5	9.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$7.60
Gary,Ind. U5	7.50
Irvin,Pa. U5	7.50
SparrowsPoint,Md. B2	7.60
Yorkville,O. W10	7.50

SHEETS, LT. Coated Ternes, 6 lb

Yorkville,O. W10	$8.40

SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5	$9.50
Yorkville,O. W10	9.50

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10	5.20
Gary,Ind. U5	5.20
Mansfield,O. E6	6.05
Middletown,O. A10	5.20
Niles,O. N12	6.00
Weirton,W.Va. W6	5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.60

SHEETS, Enameling Iron

Ashland,Ky.(8) A10	4.65
Cleveland R2	4.65
Gary,Ind. U5	4.65
GraniteCity,Ill. G4	5.35
Ind.Harbor,Ind. I-2	4.65
Irvin,Pa. U5	4.65
Middletown,O. A10	4.65
Youngstown Y1	4.65

SHEETS, Culvert No. 16	Cu Alloy	Cu Fe
Ashland A10	5.60	
Canton,O. R2	5.65	6.10
Fairfield,Ala. T2	5.60	5.85
Gary, U5	5.60	5.85
IndianaHarbor I-2	5.60	5.85
Irvin,Pa. U5	5.60	5.85
Kokomo C16	6.25	
MartinsFy.O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	
SparrowsPt. B2	5.60	
Torrance,Cal. C11	6.35	

SHEETS, Culvert, No. 16 Pure Iron

Ashland,Ky. A10	5.85
Fairfield,Ala. T2	5.85

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland(8) A10	3.85
Cleveland R2	4.20
Ind.Harbor,Ind. I-2	3.85
Warren,O. R2	4.20

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2	4.95
Middletown,O. A10	4.85
Warren,O. R2	4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10	5.05
Canton,O. R2	5.55

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	5.30
Middletown,O. A10	5.30

SHEETS, ALUMINIZED

Butler,Pa. A10	8.15

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind. U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.55
SparrowsPoint,Md. B2	7.25	7.50	7.90
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	7.80

SHEETS, SILICON, H.R. or C.R.(22 Ga.) COILS (Cut Lengths 1/2c lower)	Field	Arma-ture	Elec-tric	Motor	Dyna-mo
BeechBottom W10 (cut lengths)	...	...	7.25	8.50	9.30
Brackenridge,Pa. A4	...	...	7.75	9.00	9.80
GranteCity,Ill.G4 (cut lengths)	...	...	7.95	9.20	...
Ind.Harbor,Ind. I-2	6.95	7.25	(34)	...	...
Mansfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)	...	6.75	7.25	...	...
Vandergrift,Pa. U5	...	7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10	...	7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths 1/2c lower) Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35	...	...	...
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35	...	...	...
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)	...	...	14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$8.45	$8.70
Fairfield,Ala. T2	8.55	8.80
Gary U5	8.45	8.70
Ind.Har. I-2, Y1	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts.,Cal. C11	9.20	9.45
Sp.Pt.Md. B2	8.55	8.80
Warren R2	8.45	8.70
Weirton W6	8.45	8.70
Yorkville,O. W10	8.45	8.70

BLACK PLATE (Base Box)

Aliquippa J5	$6.25
Fairfield,Ala. T2	6.35
Gary,Ind. U5	6.25
GraniteCity,Ill. G4	6.45
Ind.Harbor,Ind. I-2, Y1	6.25
Irvin,Pa. U5	6.25
Niles,O. R2	6.25
Pittsburg,Calif. C11	7.00
SparrowsPoint,Md. B2	6.35
Warren,O. R2	6.25
Weirton,W.Va. W6	6.25
Yorkville, O. W10	6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4	5.85
Gary,Ind. U5	5.85
GraniteCity,Ill. G4	6.05
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. U5	5.85
Yorkville,O. W10	6.15

STRIP, Hot-Rolled Alloy

Bridgprt,Conn.(10)	S15 5.45
Carnegie,Pa. S18	5.85
Fontana,Calif. K1	6.70
Gary,Ind. U5	5.50
Houston,Tex. S5	5.90
KansasCity,Mo. S5	6.10
Midland,Pa. C18	5.85
NewBritn,Conn.(10)	S15 5.45
Sharon,Pa. S8	5.85
Youngstown U5	5.50

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	5.30
Conshohocken,Pa. A3	5.55
Ecorse,Mich. G5	5.95
Fairfield,Ala. T2	5.30
Fontana,Calif. K1	6.20
Gary,Ind. U5	5.30
Ind.Harb.,Ind. I-2	5.30
IndianaHarbor,Ind. Y1	5.80
Lackawanna,N.Y. B2	4.95
LosAngeles(25) B3	6.05
Seattle B3	6.30
Sharon,Pa. S3	5.40
So.SanFrancisco(25) B3	6.05
SparrowsPoint,Md. B2	4.95
Warren,O. R2	5.30
Weirton,W.Va. W6	5.75
Youngstown Y1	5.80
Youngstown U5	5.30

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland J5	6.70
Cleveland A7	6.55
Dover,O. G6	7.30
Fontana,Calif. K1	6.96
Lackawanna,N.Y. B2	6.40
Sharon,Pa. S3	6.55
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.55
Weirton,W.Va. W6	7.20
Youngstown Y1	7.06

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	3.50
Alton,Ill.(1) L1	3.75
Ashland,Ky.(8) A10	3.50
Atlanta A11	4.05
Bessemer,Ala. T2	3.50
Bridgeprt,Conn.(10)	S15 4.00
Buffalo(27) R2	3.50
Butler,Pa. A10	3.50
Carnegie,Pa. S18	4.00
Conshohocken,Pa. A3	3.90
Detroit M1	4.40
Ecorse,Mich. G5	3.80
Fairfield,Ala. T2	3.50
Fontana,Calif. K1	4.75
Gary,Ind. U5	3.50
Houston,Tex. S5	4.90
Ind.Harbor,Ind. I-2, Y1	3.50
Johnstown,Pa.(25) B2	3.50
KansasCity,Mo.(9) S5	4.10
Lackawanna,N.Y.(32) B2	3.50
LosAngeles B3	4.25
Milton,Pa. B6	4.00
Minnequa,Colo. C10	4.55
NewBritain (10) S15	4.00
NoTonawanda,N.Y. B11	3.50
Pittsburg,Calif. C11	4.25
Riverdale,Ill. A1	3.50
SanFrancisco S7	4.85
Seattle B3, N14	4.50
Sharon,Pa. S3	4.00
So.Chicago,Ill. W14	3.50
So.SanFrancisco B3	4.25
SparrowsPoint,Md. B2	3.50
Torrance,Calif. C11	4.25
Warren,O. R2	3.50
Weirton,W.Va. W6	3.60
WestLeechburg,Pa. A4	3.75
Youngstown U5, Y1	3.50

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10)	S15 10.75
Carnegie,Pa. S18	10.60
Cleveland A7	10.60
Dover,O. G6	10.50
Fontana,Calif. K1	11.65
Harrison,N.J. C18	10.60
Midland,Pa. C18	10.60

STRIP, Cold-Finished, Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea,O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10)	S15 5.35	6.80	7.40	9.35	11.65
Bristol,Conn. W1	...	...	7.70	9.65	...
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	5.60	7.05	7.65	...	...
Detroit D2	5.60	6.65	7.25	...	...
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
FranklinPark,Ill. T6	5.00	6.60	7.55	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.95
NewBritn.,Conn.(10)	S15 5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	...
NewCastle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2	5.85	6.75	7.35	...	...
NewYork W3	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. N8: Cleve.-or-Pitts.Base	...	6.80	7.40	9.35	11.65
Worcester,Base	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6	5.50	6.75	7.70	9.65	11.95
Youngstown CS	...	6.80	7.40	9.35	11.65

Spring Steel (Tempered)					
Trenton,N.J. R5	...	...	10.30	12.50	15.35
Harrison,N.J. C18	...	...	10.30	12.50	15.35
NewYork W3	...	...	10.30	12.50	15.35

NewBritn,Conn.(10) S15 10.75
Pawtucket,R.I.(11) 10.75
Pawtucket,R.I.(12) 11.05
Sharon,Pa. S3 10.90
Worcester,Mass. A7 10.30
Youngstown CS 10.60

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6	5.50
Berea,O. C7	6.60
Bridgprt,Conn.(10)	S15 5.35
Butler,Pa. A10	4.65
Cleveland A7, J5	4.65
Dearborn,Mich. D8	5.60
Detroit D2	5.60
Detroit M1	5.45
Dover,O.(40) G6	5.50
Ecorse,Mich. G5	4.85
Follansbee,W.Va. F4	5.85
Fontana,Calif. K1	6.30
FranklinPark,Ill.(40) T6	4.90
Ind.Harbor,Ind. I-2	4.50
Lackawanna,N.Y. B2	4.65
LosAngeles C1	6.60
Mattapan,Mass. T6	5.50
Middletown,O. A10	4.80
NewBritain(10) S15	5.35
NewCastle,Pa. B4	5.35
NewCastle(40) E5	5.25
NewHaven,Conn. D2	5.85
NewHaven,Conn. A7	5.15
Pawtucket,R.I. R3	6.00
Pawtucket,R.I.(22) N8	5.85
Riverdale,Ill.(40) A1	4.90
Rome,N.Y. R6	5.10
Sharon,Pa. S3	5.35
SparrowsPoint,Md. B2	4.65
Trenton,N.J. R5	6.00
Wallingford,Conn. W2	5.85
Warren,O.(40) T5	5.25
Warren,O. R2	4.65
Weirton,W.Va. W6	4.65
Youngstown C8 (40)	5.25
Youngstown Y1	4.65

STRIP, Electro Galvanized

Dover,O. G6	5.50
Warren,O. T5	5.25
Weirton,W.Va. W6	4.65
Youngstown C8	5.25

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Boiardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Corp.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10 ..... 3.75
Warren, O. R2 ..... 4.10

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2 ..... 5.25

TIGHT COOPERAGE HOOP

Atlanta A11 ..... 4.05
Riverdale, Ill. A1 ..... 3.90
Sharon, Pa. S3 ..... 4.15
Youngstown U5 ..... 3.75

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
AlabamaCity R2	5.70	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.95	6.40
Bartonville(19) K4	5.70	6.15
Buffalo W12	4.85	...
Cleveland A7	5.70	6.15
Crawfordsville MS	5.95	6.40
Donora A7	5.70	6.15
Duluth A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston,Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet,Ill. A7	5.70	6.15
KansasCy,Mo. S5	6.30	6.75
Kokomo C16	5.80	6.05
LosAngeles B3	6.65	...
Minnequa C10	5.95	6.45
Monessen P7	5.95	6.40
Palmer W12	5.15	...
Pitts.Calif. C11	6.65	6.80
Prtsmth.(18)P12	6.10	6.60
Rankin A7	5.70	6.15
So.Chicago R2	5.70	5.95
So.S.Fran. C10	6.65	7.10
Sparrows Pt. B2	5.80	6.25
Sterling,Ill.(1)N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. C11	6.65	...
Worcester A7	6.00	6.45

WIRE, (16 gage)	An'ld Stone	Galv. Stone
Aliquippa J5	10.15	12.15
Bartonville(1) K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfrdsvle MS	10.30	12.00
Fostoria,O. S1	10.40	13.00
Johnstown B2	10.25	12.15
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer,Mass.W12	10.25	12.15
Pitts.Cal. C11	10.60	12.50
Prtsmth. (18) P12	10.55	12.30
SparrowsPt. B2	10.35	12.25
Waukegan A7	10.25	12.15

ROPE WIRE	(A)	(B)
Bartonville,Ill. K4	8.55	8.80
Buffalo W12	8.55	8.80
Cleveland A7	8.55	8.80
Donora,Pa. A7	8.55	8.80
Fostoria, O. S1	8.85	9.10
Johnstown,Pa. B2	8.55	8.80
Monessen,Pa. P16	8.55	8.80
Monessen,Pa. P7	8.80	9.05
NewHaven A7	8.85	8.10
Palmer,Mass. W12	8.85	9.10
Portsmouth,O. P12	8.55	8.80
Roebling,N.J. R5	8.85	9.10
SparrowsPt. B2	8.65	8.90
Struthers, O. Y1	8.55	8.80
Trenton,N.J. A7	8.85	9.10
Waukegan,Ill. A7	8.55	8.80
Worcester J4, T6	8.85	9.10

(A) Plow and Mild Plow.
(B) Improved Plow.

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ... 4.85
Aliquippa,Pa. J5 ... 4.85
Atlanta A11 ... 5.10
Alton,Ill.(1) L1 ... 4.85
Bartonville,Ill.(1) K4 ... 4.85
Buffalo W12 ... 4.85
Chicago W13 ... 5.10
Cleveland A7, C20 ... 4.85
Crawfordsville,Ind. MS .. 5.10
Donora,Pa. A7 ... 4.85
Duluth,Pa. A7 ... 4.85
Fairfield,Ala. T2 ... 4.85
Fostoria,O.(24) S1 ... 5.35
Houston S5 ... 5.25
Johnstown,Pa. B2 ... 4.85
Joliet, Ill. A7 ... 4.85
KansasCy,Mo. S5 ... 5.46
Kokomo,Ind. C16 ... 4.95
LosAngeles B3 ... 5.80
Minnequa,Colo. C10 ... 5.10
Monessen,Pa. P7 ... 5.10
Newark, 6-8ga. 1-1 ... 5.50
No. Tonawanda B11 ... 4.85
Palmer,Mass. W12 ... 5.15
Pittsburg,Calif. C11 ... 5.80
Portsmouth,O. P12 ... 5.25
Rankin,Pa. A7 ... 4.85
So.Chicago,Ill. R2 ... 4.85
So.SanFrancisco C10 ... 5.80
SparrowsPoint,Md. B2 ... 4.95
Sterling,Ill.(1) N15 ... 4.85
Struthers,O. Y1 ... 4.85
Torrance,Calif. C11 ... 5.80
Waukegan,Ill. A7 ... 4.85
Worcester,Mass. A7, T6 .. 5.15

WIRE, Cold-Rolled Flat

Anderson,Ind. G6 ... 6.20
Buffalo W12 ... 6.35
Cleveland A7 ... 5.85
Crawfordsville,Ind. MS .. 6.20
Detroit D2 ... 6.20
Dover,O. G6 ... 6.20
Fostoria,O. S1 ... 6.00
Kokomo,Ind. C16 ... 5.70
FranklinPark,Ill. T6 ... 6.20
Massillon,O. R8 ... 5.85
Monessen,Pa. P16 ... 5.85
Monessen,Pa. P7 ... 6.10
NewHaven,Conn. D2 ... 6.50
Pawtucket,R.I.(12) NS .. 6.85
Trenton,N.J. R5 ... 6.15
Worcester A7 ... 6.15
Worcester T6 ... 6.50
Worcester W12 ... 6.65

WIRE, Fine & Weaving(8" Coils)

Bartonville,Ill.(1) K4 ... 8.90
Buffalo W12 ... 8.90
Chicago W13 ... 8.90
Cleveland A7 ... 8.90
Crawfordsville,Ind. MS .. 8.95
Fostoria,O. S1 ... 8.90
Johnstown,Pa. B2 ... 8.90
Kokomo,Ind. C16 ... 8.90
Monessen,Pa. P16 ... 8.90
Palmer,Mass. W12 ... 9.20
Portsmouth,O. P12 ... 8.90
Roebling,N.J. R5 ... 9.20
Waukegan,Ill. A7 ... 8.90
Worcester,Mass. A7, T6 .. 9.20

WIRE, Galv'd ACSR For Cores

Bartonville,Ill. K4 ... 8.50
Monessen,Pa. P16 ... 8.50
Roebling,N.J. R5 ... 8.80
SparrowsPoint,Md. B2 ... 8.60
Johnstown,Pa. B2 ... 8.50

WIRE, Tire Bead

Bartonville,Ill.(1) K4 .. 10.90
Monessen,Pa. P16 ... 11.40
Roebling,N.J. R5 ... 11.55

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5 ... 6.25
Alton,Ill.(1) L1 ... 6.25
Bartonville,Ill.(1) K4 .. 6.26
Buffalo W12 ... 6.25
Cleveland A7 ... 6.25
Donora,Pa. A7 ... 6.25
Duluth A7 ... 6.25
Fostoria,O. S1 ... 6.25
Johnstown,Pa. B2 ... 6.25
LosAngeles B3 ... 7.20
Milbury,Mass.(12) N6 .. 8.05
Monessen,Pa. P7, P16 .. 6.25
Palmer,Mass. W12 ... 6.55
Pittsburg,Calif. C11 ... 7.20
Roebling,N.J. R5 ... 6.55
Portsmouth,O. P12 ... 6.25
So.Chicago,Ill. R2 ... 6.25
So.SanFrancisco C10 ... 7.20
SparrowsPoint,Md. B2 .. 6.35
Struthers,O. Y1 ... 6.25
Trenton,N.J. A7 ... 6.55
Waukegan,Ill. A7 ... 6.25
Worcester A7, T6, W12 .. 6.55
Worcester,Mass. J4 ... 6.75

WIRE, Upholstery Spring

Aliquippa,Pa. J5 ... 5.90
Alton,Ill.(1) L1 ... 5.90
Buffalo W12 ... 5.90
Cleveland A7 ... 5.90
Donora,Pa. A7 ... 5.90
Duluth A7 ... 5.90
Johnstown,Pa. B2 ... 5.90
LosAngeles B3 ... 6.85
Monessen,Pa. P7, P16 .. 5.90
NewHaven,Conn. A7 ... 6.20
Palmer,Mass. W12 ... 6.20
Pittsburg,Calif. C11 ... 6.85
Portsmouth,O. P12 ... 5.90
Roebling,N.J. R5 ... 6.20
So.Chicago,Ill. R2 ... 5.90
So.SanFrancisco C10 ... 6.85
SparrowsPoint,Md. B2 .. 6.00
Torrance,Calif. C11 ... 6.85
Trenton,N.J. A7 ... 6.20
Waukegan,Ill. A7 ... 5.90
Worcester,Mass. A7 ... 6.20

WOVEN FENCE, 9-15½ Ga. Col.

AlabamaCity,Ala. R2 ... 126
Ala.City,Ala.,17-18ga.R2 213
Aliquippa,Pa.9-14½ga.J5 130
Atlanta A11 ... 133
Bartonville,Ill.(19) K4 .. 130
Crawfordsville,Ind. MS .. 132
Donora,Pa. A7 ... 130
Duluth A7 ... 130
Fairfield,Ala. T2 ... 130
Houston,Tex. S5 ... 138
Johnstown,Pa. B2 ... 130
Johnstown,17ga.,6" B2 .. 204
Johnstown,17ga.,4" B2 .. 207
Joliet,Ill. A7 ... 130
KansasCity,Mo. S5 ... 142
Kokomo,Ind. C16 ... 132
Minnequa,Colo. C10 ... 138
Monessen,Pa. P7 ... 135
Pittsburg,Calif. C11 ... 153
Portsmouth,O.(18) P12 .. 137
Rankin,Pa. A7 ... 130
So. Chicago,Ill. R2 ... 126
Sterling,Ill.(1) N15 ... 130

FENCE POSTS — Col.

ChicagoHts.,Ill. C2 ... 140
Duluth A7 ... 125
Franklin,Pa. F5 ... 140
Huntington,W.Va. W7 ... 140
Johnstown,Pa. B2 ... 140
Marion,O. P11 ... 140
Minnequa,Colo. C10 ... 130
Moline,Ill. R2 ... 136
So.Chicago R2 ... 140
Tonawanda B12 ... 140
Williamsport,Pa. S19 ... 150

WIRE, Barbed — Col.

AlabamaCity,Ala. R2 ... 136
Aliquippa,Pa. J5 ... 140
Atlanta A11 ... 143
Bartonville,Ill.(19) K4 .. 143
Crawfordsville MS ... 145
Donora,Pa. A7 ... 140
Duluth,Minn. A7 ... 140
Fairfield,Ala. T2 ... 140
Houston,Tex. S5 ... 148
Johnstown,Pa. B2 ... 140
Joliet,Ill. A7 ... 140
KansasCity,Mo. S5 ... 162
Kokomo,Ind. C16 ... 142
Minnequa,Colo. C10 ... 146
Monessen,Pa. P7 ... 145
Pittsburg,Calif. C11 ... 160
Portsmouth,O.(18) P12 .. 147
Rankin,Pa. A7 ... 140
So.Chicago,Ill. R2 ... 136
So.SanFran.,Calif. C10 .. 160
SparrowsPoint,Md. B2 .. 142
Sterling,Ill.(1) N15 ... 140

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2 ... 123
Atlanta A11 ... 126
Bartonville,Ill.(19) K4 .. 123
Crawfordsville MS ... 132
Donora,Pa. A7 ... 123
Duluth A7 ... 123
Fairfield,Ala. T2 ... 123
Joliet,Ill. A7 ... 123
KansasCity,Mo. S5 ... 135
Kokomo,Ind. C16 ... 125
Minnequa,Colo. C10 ... 128
Pittsburgh,Calif. C11 ... 147
So.Chicago,Ill. R2 ... 123
So.SanFran.,Calif. C10 .. 147
SparrowsPoint,Md. B2 .. 125
Sterling,Ill.(1) N15 ... 123

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2 ... 6.10
Bartonville,Ill.(19) K4 .. 5.95
Crawfordsville,Ind. MS .. 6.30
Donora,Pa. A7 ... 5.95
Duluth A7 ... 5.95
Johnstown,Pa. B2 ... 5.95
Joliet,Ill. A7 ... 5.95
Kokomo,Ind. C16 ... 6.05
Minnequa,Colo. C10 ... 6.20
Pittsburg,Calif. C11 ... 6.90
Portsmouth,O. P12 ... 6.25
Rankin,Pa. A7 ... 5.95
So.Chicago,Ill. R2 ... 6.10
SparrowsPoint,Md. B2 .. 6.05
Sterling,Ill.(1) N15 ... 5.65
Worcester,Mass. A7 ... 6.25

NAILS, Cut (100 lb keg)
To dealers (33)

Conshohocken,Pa. A3 .. $7.35
Wheeling,W.Va. W10 ... 7.15

NAILS & STAPLES, Stock

To dealers & mkrs. (7)	Col.
AlabamaCity,Ala. R2	118
Aliquippa,Pa.(13) J5	118
Atlanta A11	121
Bartonville,Ill.(19) K4	118
Chicago,Ill. W13	118
Cleveland A9	125
Crawfordsville,Ind. MS	122
Donora,Pa. A7	118
Duluth A7	118
Fairfield,Ala. T2	118
Galveston,Tex. D7	126
Houston,Tex. S5	126
Johnstown,Pa. B2	118
Joliet,Ill. A7	118
KansasCity,Mo. S5	130
Kokomo,Ind. C16	120
Minnequa,Colo. C10	123
Monessen,Pa. P7	124
Pittsburg,Calif. C11	137
Portsmouth,O. P12	124
Rankin,Pa. A7	118
So.Chicago,Ill. R2	118
SparrowsPoint,Md. B2	120
Sterling,Ill.(1) N15	118
Torrance,Calif. C11	138
Worcester,Mass. A7	124

STANDARD TRACK SPIKES

Ind.Harbor,Ind. 1-2, Y1 .. 6.15
KansasCity,Mo. S5 ... 6.40
Lebanon,Pa. B2 ... 6.15
Minnequa,Colo. C10 ... 6.15
Pittsburgh J5 ... 6.15
Seattle B3 ... 6.65
So.Chicago,Ill. R2 ... 6.15
Struthers,O. Y1 ... 6.15
Youngstown R2 ... 6.15

TRACK BOLTS (20) Treated

KansasCity,Mo. S5 ... 9.85
Lebanon,Pa.(32) B2 ... 9.85
Minnequa,Colo. C10 ... 9.85
Pittsburgh O3, P14 ... 9.85
Seattle B3 ... 10.10

TIE PLATES

Fairfield,Ala. T2 ... 4.50
Gary,Ind. U5 ... 4.50
Ind.Harbor,Ind. I-2 ... 4.50
Lackawanna,N.Y. B2 ... 4.50
Minnequa,Colo. C10 ... 4.50
Pittsburg,Calif. C11 ... 4.65
Seattle B3 ... 4.65
Steelton,Pa. B2 ... 4.50
Torrance,Calif. C11 ... 4.65

JOINT BARS

Bessemer,Pa. U5 ... 4.70
Fairfield,Ala. T2 ... 4.70
Ind.Harbor,Ind. I-2 ... 4.70
Joliet,Ill. U5 ... 4.70
Lackawanna,N.Y. B2 ... 4.70
Minnequa,Colo. C10 ... 4.70
Steelton,Pa. B2 ... 4.70

AXLES

Ind.Harbor,Ind. S18 ... 5.60
Johnstown,Pa. B2 ... 5.60

RAILS	Std. No. 1	Std. No. 2	Std. Alt No. 2	TeeRails 60 lb Under
Bessemer,Pa. U5	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	...	4.00
Fairfield,Ala. T2	...	...	...	4.00
Gary,Ind. U5	3.60	3.50	3.55	...
Huntington,W.Va. W7	...	...	...	5.00
Ind.Harbor,Ind. I-2	3.60	3.50	3.55	...
Johnstown,Pa. B2	...	...	...(16)	4.00
Lackawanna B2	3.60	3.50	...	4.00
Minnequa,Colo. C10	3.60	3.50	...	4.50
Steelton,Pa. B2	3.60	3.50	...	...
Williamsport,Pa. S19	...	...	...	4.75

Key to Producers

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield, S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.

U1 Ulster Iron Works
U4 Universal Cyclops Steel
U5 United States Steel Co.
V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West. Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

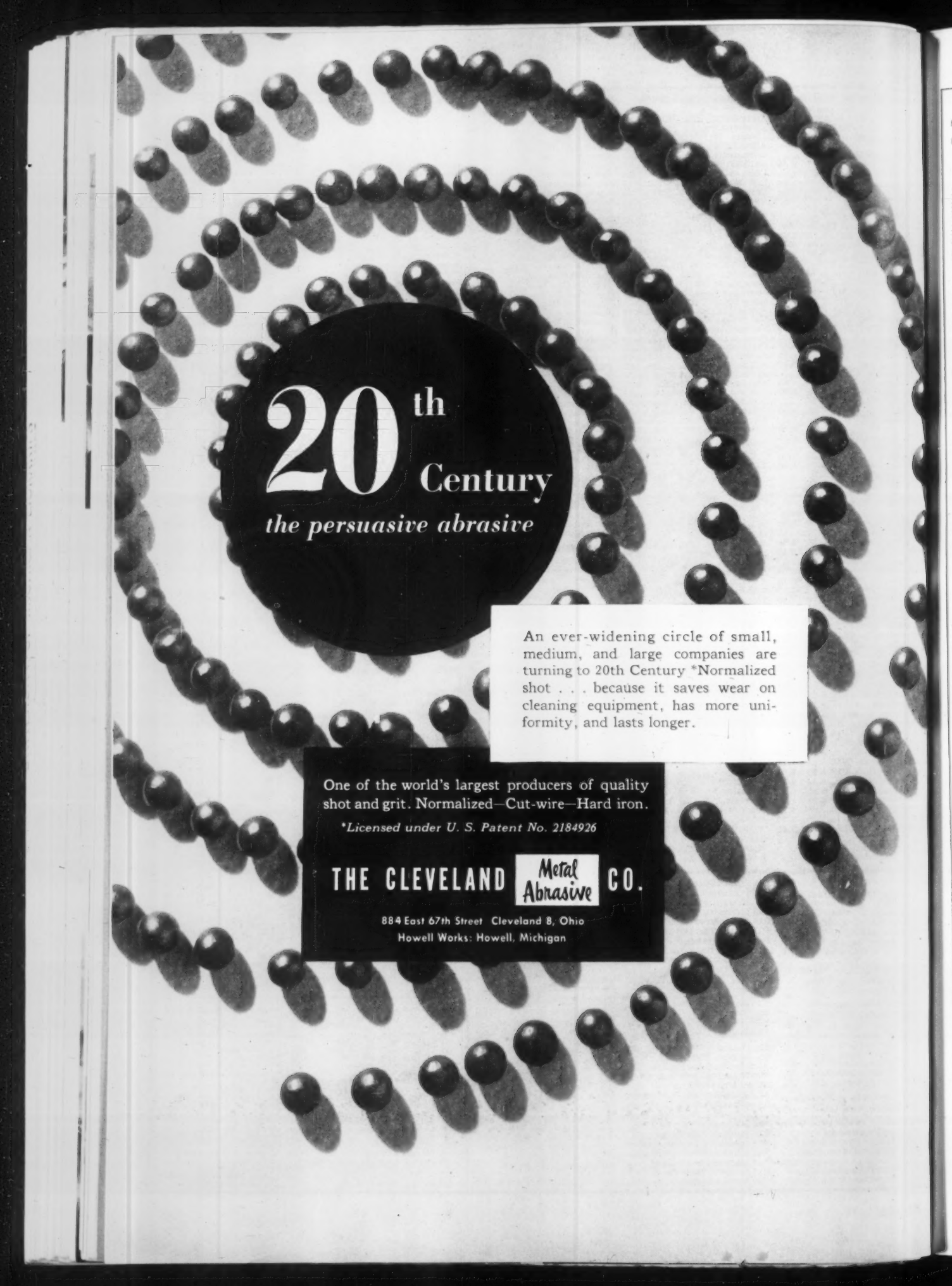
Y1 Youngstown Sheet & Tube

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	23.00	13.5W,4Cr,3V	140.00
Extra Carbon	27.00	18W,4Cr,2V,9Co	217.50
Spec. Carbon	32.50	19W,4Cr,2V,7Co	217.50
Oil Hardening	35.00	18.25W,4.25Cr,1V,4.75Co	185.50
Cr Hot Wrk	35.00	20.25W,4.25Cr,1.6V,12.25Co	323.00
Hi-Carbon-Cr	63.50	1.5W,4Cr,1V,8.5Mo	78.50
18W,4Cr,1V	123.50	6.4W,4.5Cr,1.9V,5Mo	87.00
18W,4Cr,2V	138.00	6W,4Cr,3V,6Mo	109.50

Tool steel producers include: A4, A5, B2, B8, C4, C9, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2, V3.

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga. & heavier.
(14) Also wide flange beams.
(15) ¼" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. base.
(22) Del. San Fran. Bay area.
(23) 28 Ga. 26" wide.
(24) Deduct 0.20c,finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, mill lengths, to fabricators; to consumers, 5.60c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Subject to 10% increase.
(30) Sheared; add 0.35c for universal mill.
(31) Not annealed.
(32) Rd. edge of square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter: 60" & narrower.
(38) 14 gage & lighter: 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.


20th Century
the persuasive abrasive
An ever-widening circle of small, medium, and large companies are turning to 20th Century *Normalized shot . . . because it saves wear on cleaning equipment, has more uniformity, and lasts longer.
One of the world's largest producers of quality shot and grit. Normalized—Cut-wire—Hard iron.
*Licensed under U. S. Patent No. 2184926
THE CLEVELAND Metal Abrasive CO.
884 East 67th Street Cleveland 8, Ohio
Howell Works: Howell, Michigan

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.5c	0.24	34.0	32.0	29.0	1.5	+0.5	+3.5
¼	6.0	0.42	28.5	26.5	23.5	+1.0	+3.0	+6.0
⅜	8.0	0.57	23.5	21.5	18.5	+7.0	+9.0	+12.0
½	8.5	0.85	36.0	34.0	35.0	14.0	12.0	13.0
¾	11.5	1.13	39.0	37.0	38.0	18.0	16.0	17.0
1	17.0	1.68	41.5	39.5	40.5	21.5	19.5	20.5
1¼	23.0	2.28	42.0	44.0	41.0	22.0	24.0	21.0
1½	27.5	2.78	42.5	41.5	41.5	23.0	21.5	22.0
2	37	3.68	43.0	41.0	42.0	23.5	21.5	22.5
2½	58.5	5.82	43.5	41.5	42.5	24.0	22.0	23.0
3	76.5	7.62	43.5	41.5	42.5	24.0	22.0	23.0

Column A: Etna, Pa. N2; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 3½ points lower on ¼", 1½ points lower on ⅜", and 2 points lower on ½", W10; Sharon, Pa. M6, 1 point higher on ⅛", 2 points lower on ¼" and ⅜". Following make ½" and larger: Lorain, O., N3; Youngstown R2 and 36¼% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11½ points lower on ½" and larger continuous weld and 24½ on 3½" and 4". Columns B & E: Sparrows Point, Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1; Alton, Ill. (Gary base) L1.

Column D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, except plus 3½% on ⅛", plus 2½% on ¼", plus 9% on ⅜"; Sharon, Pa. M6, plus 0.5 on ⅛", 1 point lower on ½", ¾", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3". Following quote only on ½" and larger: Lorain, O. N3; Youngstown R2, and 16½% on 3½" and 4"; Youngstown Y1. Aliquippa, Pa. J5 quotes 1 point lower on ¾", 2 points lower on 1", 1½ points lower on 1¼", 2 points lower on 1½" and 2", 1½ points lower on 2½" and 3"; Etna, Pa. N2 and 18½% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	29.5	9.5	29.5	9.5
2½	58.5	5.82	32.5	12.5	32.5	12.5
3	76.5	7.62	32.5	12.5	32.5	12.5
3½	92.0	9.20	34.5	14.5	34.5	14.5
4	$1.09	10.89	34.5	14.5	34.5	14.5
5	1.48	14.81	37.0	17.0	37.0	17.0
6	1.92	19.18	37.0	17.0	37.0	17.0

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt lower on 2½-6 in.; Lorain N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	13.45	16.47	15.36	15.36
1¼	13	16.09	19.71	15.61	18.19
1½	13	17.27	21.15	17.25	20.30
1¾	13	19.29	23.62	19.62	23.09
2	13	21.62	26.48	21.99	25.86
2¼	13	24.35	29.82	24.50	28.84
2½	12	26.92	32.97	26.98	31.76
2½	12	29.65	36.32	29.57	34.76
2¾	12	32.11	39.33	31.33	36.84
3	12	34.00	41.64	32.89	38.70

CLAD STEELS

(Cents per pound)

Cladding Stainless	Plates—Carbon Base 10%	Plates—Carbon Base 20%	Strip—Cold-Rolled Carbon Base 10%	Strip—Cold-Rolled Carbon Base Both Sides	Sheets—Carbon Base 10%	Sheets—Carbon Base 20%	Sheets—Cu Base Both Sides
302	....	....	....	....	19.75	27.50	77.00
304	25.00	28.00–29.50	....	....	20.75–24.50	27.50	77.00
309	30.50	35.00	....	....	....	....	....
310	36.50	41.00	....	....	....	....	144.00
316	29.50	31.50–34.00	....	....	26.00	36.50	....
317	34.50	39.00	....	....	....	....	....
318	38.50	38.00	....	....	....	....	....
321	26.50	31.00	....	....	23.00	33.00	111.00
347	27.50	30.50–32.00	....	....	24.00	33.50	130.00
405	21.25	27.75	....	....	....	....	....
410	20.75	27.25	....	....	....	....	....
Nickel	33.25	44.25	41.00	54.00	....	....	....
Inconel	41.00	53.50	....	....	....	....	165.00
Monel	34.75	45.75	....	....	....	....	....
Copper*	....	....	23.70†	29.65‡	....	....	....

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, sheet, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16, Coatesville, Pa. L7 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; nickel, monel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 15
- ⅝-in. & ¾-in. 18.5
- ⅞-in. and larger 17.5

Longer than 6 in.:
- All diams. 14

Lag bolts, al diams.:
- 6 in. and shorter 23
- over 6 in. long 21

Ribbed Necked Carriage 18.5
Blank 34
Plow 34
Step, Elevator, Tap, and Sleigh Shoe 21
Tire bolts 12
Boiler & Fitting-Up bolts 31

NUTS

	Reg.	Heavy
H.P. & C.P. Square:		
½-in. & smaller	15	15
⅝-in. & ¾-in.	12	6.5
⅞-in.-1½-in.	9	1
1⅝ in. & larger	7.5	1
H.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ¾-in.	16.5	6.5
⅞-in.-1½-in.	12	2
1⅝-in. & larger	8.5	2
C.P. Hex.		
½-in. & smaller	26	22
⅝-in. & ¾-in.	23	17.5
⅞-in. & 1½-in.	19.5	12
1⅝-in. & larger	12	6.5

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or key quantities)

	Reg.	Hvy.
½-in. & smaller	35	28.5
⅝-in. & ¾-in.	29.5	22
⅞-in.-1½-in.	24	15
1⅝-in. & larger	13	8.5
		Light
⅜-in. & smaller		35
½-in. to ¾-in.		28.5
⅞-in. to 1½-in.		26

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish ..... 48 & 10
Plated finishes ... 31 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ⅝-in. & smaller 42
- ¾-in. through 1 in. .. 34

Longer than 6 in.:
- ⅝-in. & smaller 26
- ¾-in. through 1 in. ... 4

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter 38
1 in. and smaller diam. x over 6 in. 26

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 35
¼-in. diam. & larger.... 16
N.F. thread, all diams... 10

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 7.85c
⅞-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..List to list-plus-50c.

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Diam.	Length	Cents per lb
17,18,20	60,72	17.85
8 to 16	48,60,72	17.85
7	48,60	19.57
6	48,60	20.95
4.5⅛	40	21.50
3	40	22.61
2½	24,30	23.15
2	24,30	25.36

CARBON

40	100,110	8.03
35	100,110	8.03
30	84,110	8.03
24	72 to 104	8.03
17 to 20	34,90	8.03
14	60,72	8.57
10,12	60	8.84

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301	41.00	34.00	31.25
302	41.00	36.50	31.25
303	43.00	40.00	33.75
304	43.00	38.50	32.75
309	55.50	54.50	44.25
316	56.50	58.50	48.75
321	49.00	48.00	36.75
347	53.50	52.00	41.25
410	36.50	30.50	25.75
416	37.00	37.00	26.25
420	44.00	47.00	31.25
430	39.00	31.00	26.25
501	27.50	26.00	14.25
502	28.50	27.00	15.25

Baltimore, Types 301 through 347 sheet, except 309 E2.
Brackenridge, Pa., sheets A4.
Bridgeville, Pa., bars, wire, sheets & strip U4.
Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502, A10.
Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502, S18.
Cleveland, strip A7.
Detroit, strip, except Types 309, 321, 416, 420, 501 and 502 M1.
Dunkirk, N.Y., bars, wire A4.
Duquesne, Pa., bars U5.
Fort Wayne, Ind., bars and wire, except Types 501 & 502 J6.
Gary, Ind., sheets except Type 416 U5.
Harrison, N. J., strip C18.
McKeesport, Pa., bars, sheets except Type 416 U5.
McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.
Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.
Midland, sheets & strip C18.
Munhall, Pa., bars U5.
Pittsburgh, sheets C18.
Reading, Pa., bars and strip, except 55.50c for Type 309 strip and 44.75c for Type 309 bars, C4.
Sharon, Pa., strip, except Types 303, 309, 316, 416, 501 and 502 S3.
So. Chicago, Ill., bars & structurals U5.
Syracuse, N. Y., bars, wire & structurals C18.
Titusville, Pa., bars, U4.
Wallingford, Conn., strip, except 309, W2 quotes 0.25 cents higher.
Washington, Pa., bars, sheets & strip, except Type 309 sheets 56.00c and bars 44.75c, J3.
Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 61.50c, strip 63.00c, W4.
Watervliet, N. Y., structurals & bars A4.
Waukegan, bars & wire A7.
West Leechburg, Pa., strip, A4.
Youngstown, strip, except Types 303, 309, 316, 416, 501 and 502 C8.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 30.00-35.00
Toluol, one deg...26.00-33.00
Industrial xylol ..25.00-33.50

Per ton bulk, ovens
Sulphate of ammonia..$32-$45

Cents per pound, ovens
Phenol, 40 (carlots, non-returnable drums) ..17.25
Do., less than carlots..18.00
Do., tank cars 15.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70%, $43; 60%, $40.

Imported, net ton, duty paid, metallurgical grade, $33-$35.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted.)

Sponge iron ..... Cents
- 98+% Fe, carlots.. 16.00
- Swedish, c.i.f. New York, in bags ...7.40-8.50

Electrolytic Iron:
- Annealed, 99.5% Fe 42.50
- Unannealed, 99 + % Fe 36.50
- Unannealed, 99 + % Fe (minus 325 mesh) 58.50

Powder Flakes 48.50
Carbonyl Iron:
- 97.9-99.8%, size 5 to 10 microns ...83.00-148.00

Aluminum:
- Carlots, freight allowed 29.50
- Atomized, 500 lb drums, freight allowed 33.50

Brass, 10-ton lots 30.00-33.25
Bronze, 10-ton lots 51.25-60.00
Phosphor-Copper, 10 tons 50.00
Copper:
- Electrolytic 43.25
- Reduced 33.75-37.00

Lead 25.50
Magnesium 75.00-85.00
Manganese:
- Minus 100-mesh 57.00
- Minus 35 mesh 52.00
- Minus 200 mesh 62.00

Nickel unannealed ... 83.00
Nickel-Silver, 10-ton lots 44.00
Silicon 38.50
Solder (plus cost of metal) 8.50
Stainles Steel, 302 .. 83.00
Zinc, 10-ton lots 23.00-30.50
Tungsten: Dollars
- 99%, minus 80 to 200 mesh, freight allowed: 1000 lb and over .. 4.00
- Less than 1000 lb .. 4.15

98.8% minus 65 mesh, freight allowed:
- 1000 lb. and over 4.15
- less than 1000 lb. 4.25

Molybdenum:
- 99%, minus 80 to 200 mesh, over 500 lb. 2.85
- 200 to 500 lb. 3.10
- less than 200 lb .. 3.25

Chromium, electrolytic 99% Cr min. 3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvll,fur. ..$14.50-15.00
Connelsvll,fdry. ..17.00-18.00
New River, foundry...21.30
Wise county, foundry..15.95
Wise county, furnace..15.20

OVEN FOUNDRY COKE

Kearney, N. J., ovens $22.75
Everett, Mass., ovens
- New England, del...*24.80

Chicago, ovens 23.00
- Chicago, del. 24.40

Terre Haute, ovens....22.50
Milwaukee, ovens 23.75
Indianapolis, ovens ...22.75
- Chicago, del. 26.28
- Cincinnati, del. 25.73
- Detroit, del. 26.71

Ironton, O., ovens 22.50
- Cincinnati, del. 25.12

Painesville, O., ovens..24.00
- Cleveland, del. 25.75

Erie, Pa., ovens 23.50
Birmingham, ovens 20.30
- Birmingham, del. 21.69

Philadelphia, ovens ...22.70
Neville Island, Pa., ovens 23.00
Swedeland, Pa., ovens. 22.60
St. Louis, ovens
- St. Louis, del. 25.40

Portsmouth, O., ovens..22.50
- Cincinnati, del. 25.12

Detroit, ovens 24.00
- Detroit, del. 25.00
- Buffalo, del. 26.75
- Flint, del. 26.49
- Pontiac, del. 25.42
- Saginaw, del. 26.81

* Or within $4.15 freight zone from works.

"Bond purchases fill a continuing employee need . . ."

C. E. WILSON

President, General Motors Corporation

"Our Payroll Savings Plan, which was inaugurated pre-Pearl Harbor, has continued without interruption in war and peace. It is our experience that employees benefit personally as well as economically from such cultivation of the habit of thrift."

In General Motors, employees have to date purchased more than $841,000,000.00 maturity value of Bonds through the Payroll Savings Plan.

Inaugurated largely for patriotic reasons in August 1941, the plan proved so helpful in meeting an employee need that GM decided to continue it as a regular part of its employee program.

The experience of General Motors is paralleled by that of many other successful organizations. In upwards of 21,000 large companies today, more than 8,000,000 Americans are investing $150,000,000 in U. S. Savings Bonds every month.

Every Payroll Savings Plan is of direct benefit to the country, the company, and the employee. It is the one way of insuring our strength as individuals and as a free people.

Employees *want* the Payroll Savings Plan. If you do not offer your people the plan . . . or if you have not made a person-to-person canvass recently—phone, wire or write to Savings Bond Division, U. S. Treasury Department, Suite 700, Washington Building, Washington, D. C. Your State Director will contact you to explain the simple pattern of the person-to-person canvass and supply you with application blanks, posters, pay envelope enclosures and other helpful material.

Act now—to help your employees, your company and the stability of the American economy.

Recent increases in employee participation in the Payroll Savings Plan following person-to-person canvasses:

Hotpoint, Inc., Chicago, from 8.7% to 96% of 9,000 employees . . . Standard Oil of Indiana (Illinois; 26,175 employees), from 32.3% to 79.1% . . . Kelly Springfield Company (Maryland; 2,000 employees), 46.8% to 83.3% . . . A. M. Byers Co. (2,500 employees), 26% to 91% . . . Crucible Steel Company (14,500 employees) reinstatement of plan, 65%. Consolidated Western Steel Corporation (California; 7,528 employees) 9.3% to 84.8% . . . Wisconsin Electric Power Co. (3,000 employees) 44.3% to 73%.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, The Advertising Council and

STEEL

The Weekly Magazine of Metalworking

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
New York (city)	6.27	7.29	8.44	6.59	...	6.42	7.29	9.25	6.40	6.58	8.04
New York (c'try)	5.97	6.99	8.14	6.29	...	6.12	6.99	8.95	6.10	6.28	7.74
Boston (city)	6.40	7.20	8.49	6.35	...	6.25	7.04	9.25	6.40	6.98	7.88
Boston (c'try)	6.20	7.00	8.29	6.15	...	6.05	6.84	9.05	6.20	6.78	7.68
Phila. (city)	7.15	7.05	8.25	6.35	...	6.30	7.11	8.90	6.15	6.30	7.40
Phila. (c'try)	6.90	6.80	8.00	6.10	...	6.05	6.86	8.65	5.90	6.05	7.15
Balt. (city)	5.80	7.04	8.27	6.24	...	6.24	7.09	...	6.34	6.00	7.64
Balt. (c'try)	5.60	6.84	8.07	6.04	...	6.04	6.89	...	6.14	5.80	7.44
Norfolk, Va.	6.50	...	...	6.70	...	6.55	7.70	...	6.60	6.50	8.00
Richmond, Va.	5.90	...	8.10	6.10	...	6.10	6.90	...	6.30	6.05	7.80
Wash. (w'hse)	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
Buffalo (del.)	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††§	6.00	6.25	7.55
Buffalo (w'hse)	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††§	5.80	6.05	7.35
Pitts. (w'hse)	5.60	6.40*	7.75	5.65-5.95	6.90	5.55	6.40	10.10††	5.70	5.75	7.00
Detroit (w'hse)	5.45-5.78	6.53-6.80	7.99	5.94-5.95	7.75	5.84	6.56	8.91	6.09	6.19-6.35	7.28
Cleveland (del.)	5.80	6.60	8.30	5.89	7.10	5.77	6.60-6.70	8.91	10.02	6.12	7.32
Cleve. (w'hse)	5.60	6.40	8.10	5.69	6.90	5.57	6.40-6.50	8.71	5.82	5.92	7.12
Cincin. (city)	6.02	6.59	7.34	5.95	...	5.95	6.51	...	6.24	6.34	7.50
Chicago (city)	5.80	6.60	7.95	5.75	...	5.75	6.50	10.30	5.90	6.00	7.20
Chicago (w'hse)∞	5.60	6.40	7.75	5.55	...	5.55	6.30	10.10	5.70	5.80	7.00
Milwaukee (city)	5.94	6.74	8.09	5.89	...	5.89	6.74	10.44	6.04	6.14	7.34
Milwau. (c'try)	5.74	6.54	7.89	5.69	...	5.69	6.54	10.24	5.84	5.94	7.14
St. Louis (del.)	6.05	6.85	8.20	6.00	...	6.00	6.85	10.55	6.23	6.33	7.53
St. L. (w'hse)	5.85	6.65	8.00	5.80	...	5.80	6.65	10.35	6.03	6.13	7.33
Kans. City(city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
KansCity(w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
Birm'hm (city)	5.75	6.55	6.90[2]	5.70	...	5.70	7.53	...	5.85	6.10	8.25
Birm'hm.(w'hse)	5.60	6.40	6.75[2]	5.55	...	5.55	7.53	...	5.70	5.95	8.23
Los Ang. (city)	6.55	8.10	9.05[3]	6.60	8.90	6.55	7.75	...	6.55	6.60	9.20
L. A. (w'hse)	6.35	7.90	8.85[3]	6.40	8.70	6.35	7.55	...	6.35	6.40	8.70
San Francisco	6.65	7.80[4]	8.90[3]	6.60	...	6.45	8.20	...	6.45	6.50	8.60
Seattle-Tacoma	7.05	8.60[2]	9.20[3]	7.30	...	6.75	9.10	11.15	9.65	6.75	8.80

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded; ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over. [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—3500 lb and over; [5]—1000 to 1999 lb.

ORES

Lake Superior Iron Ore

Gross ton, 51½% (natural), lower lake ports.

After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

Eastern Local Ore

Cents per unit, del. E. Pa.

Foundry and basis 56-62% concentrates contract	17.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	15.75
Brazilian iron ore, 68-69%	18.00

Tungsten Ore

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$65.00
Domestic scheelite, mines	65.00

Manganese Ore

Indian manganese, 46-48%, nearby, 92.00-96.00c per long ton unit, c.i.f. U. S. ports, duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 79.8-81.8c.

Chrome Ore

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00

South African Transvaal

44% no ratio	$27.00-28.00
48% no ratio	34.00-35.00

Brazilian

44% 2.5:1 lump	$32.00

Rhodesian

45% no ratio	$20.00-21.00
48% no ratio	26.00
48% 3:1 lump	35.00-36.00

Domestic—rail nearest seller

48% 3:1	$39.00

Molybdenum

Sulphide concentrates per lb. molybdenum content, mines	$1.00

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $75, Palmerton, Pa.; $75, Pittsburgh and Chicago; (16%-to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $185 per gross ton of alloy, c.l. packed, $197; gross ton lots, packed, $212; less gross ton lots, packed, $229; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., Welland, Ont., or Ashtabula, O. Base price: $187, Johnstown, Pa.; $185, Sheridan, Pa.; $188, Etna, Pa.; $190, Chattanooga, Tenn. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, Oakland, Portland, Oreg. Shipment from Chicago warehouse, ton lots $227; less gross ton lots, $244 f.o.b. Chicago. Add or subtract $2.30 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 25.75c per lb of contained Mn, carload packed 26.5c, ton lots 27.6c, less ton 28.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices. Ic for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% min., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max.). Carload, lump, bulk 19.15c per lb of contained Mn, carload packed 19.9c, ton lot 21.0c, less ton 22.2c. Delivered. Spot, add 0.25c.

Manganese metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 34c per lb of metal; packed, 34.75c; ton lot 36.25c; less ton lot 38.25c. Delivered. Spot, add 2c.

Manganese Electrolytic: 250 lb to 1999 lb, 32c; 2000 to 39,999 lb, 30c; 40,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump bulk, 1.50% C grade, 18-20% Si 9.90c per lb of alloy, carload packed, 10.65c, ton lot 11.55c, less ton 12.55c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lot 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $177 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%.) Contract, $195 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 21.75c per lb of contained Cr, c.l. packed 22.65c, ton lot 23.80c, less ton 25.20c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%.) Contract, carload, lump, bulk, max. 0.03% C 33.60c per lb of contained Cr, 0.04% C 31.50c, 0.06% C 30.50c, 0.10% C 30.00c, 0.15% C 29.75c, 0.20% C 29.50c, 0.50% C 29.25c, 1% C 29.00c, 1.50% C 28.85c, 2% C 28.75c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. S M x D, bulk, 23.25c per lb of contained Cr, C.l., packed 24.15c, ton 25.50c, less ton 27.25c. Delivered Spot, add 0.25c.

Foundry Ferrochrome, Low Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max.) Contract, carload, packed, S M x D, 16.35c per lb of alloy; ton lot 17.2c; less ton lot, 18.4c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 21.75c per lb of contained chromium plus 12.4c per pound of contained silicon; 1" x down, bulk 21.90c per pound of contained chromium plus 12.60c per pound of contained silicon. F.o.b. plant; freight allowed to destination.

Ferrochrome Silicon, No. 2: (Cr 36-39%, Si 36-39%, Al 7-9%, C 0.05% max.) 21.75c per lb of contained silicon plus 12.4c per lb of contained silicon plus aluminum, 3" x down, delivered.

Chromium Metal: (Min. 97% Cr and 1% Fe) Contract carload, 1" x D; packed, max 0.50% C grade, $1.08 per lb of contained chromium ton lot $1.10, less ton $1.12. Delivered. Spot add 5c.

Note: Current prices on silicon, boron and tungsten alloys were published on page 151, May 14, issue; calcium, tungsten, vanadium, zirconium, briquetted and "other ferroalloys" on page 125, May 28 issue. Refractories prices were published on page 151, May 14 issue.

CEILING PRICES, IRON AND STEEL SCRAP

Prices as set forth in Office of Price Stabilization ceiling price regulation No. 5, as amended Apr. 19, 1951

STEELMAKING SCRAP COMPOSITE

May 31	$44.00
May 24	44.00
Apr. 1951	44.00
May 1950	33.82
May 1946	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

Basing point ceiling prices per gross ton from which maximum shipping prices are computed on scrap of dealer and industrial origin; and from which ceiling on-line and ceiling delivered prices are computed on scrap of railroad origin.

No. 1 Heavy Melting Steel (Grade) 1

Basing Point	Dealer, Industrial	Railroad
Alabama City, Ala.	$39.00	$41.00
Ashland, Ky.	42.00	44.00
Atlanta, Ga.	39.00	41.00
Bethlehem, Pa.	42.00	44.00
Birmingham, Ala.	39.00	41.00
Brackenridge, Pa.	44.00	46.00
Buffalo, N. Y.	43.00	45.00
Butler, Pa.	44.00	46.00
Canton, O.	44.00	46.00
Chicago, Ill.	42.50	44.50
Cincinnati, O.	43.00	45.00
Claymont, Del.	42.50	44.50
Cleveland, O.	43.00	45.00
Coatesville, Pa.	42.50	44.50
Conshohocken, Pa.	42.50	44.50
Detroit, Mich.	41.15	43.15
Duluth, Minn.	40.00	42.00
Harrisburg, Pa.	42.50	44.50
Houston, Tex.	37.00	39.00
Johnstown, Pa.	44.00	46.00
Kansas City, Mo.	39.50	41.50
Kokomo, Ind.	42.00	44.00
Los Angeles	35.00	37.00
Middletown, O.	43.00	45.00
Midland, Pa.	44.00	46.00
Minnequa, Colo.	38.00	40.00
Monessen, Pa.	44.00	46.00
Phoenixville, Pa.	42.50	44.50
Pittsburg, Calif.	35.00	37.00
Pittsburgh, Pa.	44.00	46.00
Portland, Oreg.	35.00	37.00
Portsmouth, O.	42.00	44.00
St. Louis, Mo.	41.00	43.00
San Francisco	35.00	37.00
Seattle, Wash.	35.00	37.00
Sharon, Pa.	44.00	46.00
Sparrows Point, Md.	42.00	44.00
Steubenville, O.	44.00	46.00
Warren, O.	44.00	46.00
Weirton, W. Va.	44.00	46.00
Youngstown, O.	44.00	46.00

Differentials from Base

Differentials per gross ton for other grades of dealer and industrial scrap:

O-H and Blast Furnace Grades

2. No. 2 Heavy Melting	—$2.00
3. No. 1 Busheling	Base
4. No. 1 Bundles	Base
5. No. 2 Bundles	— 3.00
6. Machine Shop Turnings	—10.00
7. Mixed Borings & Short Turnings	— 6.00
8. Shoveling Turnings	— 6.00
9. No. 2 Busheling	— 4.00
10. Cast Iron Borings	— 6.00

Elec. Furnace and Fdry. Grades

11. Billet, Bloom & Forge Crops	+ 7.50
12. Bar Crops & Plate	+ 5.00
13. Cast Steel	+ 5.00
14. Punchings & Plate Scrap	+ 2.50
15. Electric Furnace Bundles	+ 2.00
Cut Structurals & Plate:	
16. 3 feet and under	+ 3.00
17. 2 feet and under	+ 5.00
18. 1 foot and under	+ 6.00
19. Briquetted Cast Iron Borings	Base
Foundry Steel:	
20. 2 feet and under	+ 2.00
21. 1 foot and under	+ 4.00
22. Springs and Crankshafts	+ 1.00
23. Alloy Free Turnings	— 3.00
24. Heavy Turnings	— 1.00

Special Grades

25. Briquetted Turnings	Base
26. No. 1 Chemical Borings	— 3.00
27. No. 2 Chemical Borings	— 4.00
28. Wrought Iron	+10.00
29. Shafting	+10.00

Restrictions on Use

(1) Prices for Grades 11 and 23 may be charged only when shipped to a consumer directly from an industrial producer; otherwise ceiling prices shall not exceed prices established for Grades 12 and 8, respectively.
(2) Prices established for Grades 26 and 27 may be charged only when sold for use for chemical or annealing purposes, and in the case of Grade 27, for briquetting and direct charge into an electric furnace; otherwise ceiling prices shall not exceed price established for Grade 10.
(3) Prices established for Grade 28 may be charged only when sold to a producer of wrought iron; otherwise ceiling price shall not exceed ceiling price for corresponding grade of basic open-hearth.
(4) Premiums for Grades 11-18, 20 and 21 may be charged only when sold for use in electric and open-hearth furnaces or foundries.
(5) Prices for Grade 29 may be charged only when sold for forging or rerolling purpose.

Special Pricing Provisions

(1) Sellers of Grades 26 and 27 may make an extra charge of $1.50 per ton for loading in box cars, or 75 cents per ton for covering gondola cars with a weather-resistant covering.
(2) Ceiling price of pit scrap, ladle scrap, salamander scrap, skulls, skimmings or scrap recovered from slag dumps and prepared to charging box size shall be computed by deducting from the price of No. 1 heavy melting steel of dealer and industrial origin, the following amounts: Where iron content is 85% and over, $6; 75% and over, $10; less than 75%, $12.
(3) Ceiling price of any inferior grade of scrap not listed shall not exceed the price of No. 1 heavy melting steel less $15.

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 railroad heavy melting steel) for other grades of railroad steel scrap.

2. No. 2 Heavy Melting Steel	—$2.00
3. No. 2 Steel Wheels	Base
4. Hollow Bored Axles and loco. axles with keyways between the wheelseats	Base
5. No. 1 Busheling	— 3.50
6. No. 1 Turnings	— 3.00
7. No. 2 Turnings, Drillings & Borings	—12.00
8. No. 2 Cast Steel and uncut wheelcenters	— 6.00
9. Uncut Frogs, switches	Base
10. Flues, Tubes & Pipes	— 8.00
11. Structural, Wrought Iron and/or steel, uncut	— 6.00
12. Destroyed Steel Cars	— 8.00
13. No. 1 Sheet Scrap	— 9.50
14. Scrap Rails, Random Lengths	+ 2.00
15. Rerolling Rails	+ 7.00
Cut Rails:	
16. 3 feet and under	+ 5.00
17. 2 feet and under	+ 6.00
18. 18 inches and under	+ 8.00
19. Cast Steel, No. 1	+ 3.00
20. Uncut Tires	+ 2.00
21. Cut Tires	+ 5.00
Bolsters & Side Frames	
22. Uncut	Base
23. Cut	+ 3.00
24. Angle, Splice Bars & Tie Plates	+ 5.00
25. Solid Steel Axles	+12.00
26. Steel Wheels, No. 3 oversize	Base
27. Steel Wheels, No. 3	+ 5.00
28. Spring Steel	+ 5.00
29. Couplers & Knuckles	+ 5.00
30. Wrought Iron	+ 8.00
31. Fireboxes	— 8.00
32. Boilers	— 6.00
33. No. 2 Sheet Scrap	—13.00
34. Carsides, Doors, Car Ends, cut apart	— 6.00

Restrictions on Use

(1) Price established for Grade 15 may be charged only when purchased and sold for rerolling uses; otherwise, ceiling shall not exceed that for Grade 14.
(2) Price established for Grade 30 may be charged only when sold to a producer of wrought iron; otherwise, ceiling shall not exceed that for No. 1 heavy melting steel.
(3) Price for Grade 25 may be charged only when sold for rerolling and forging purposes; otherwise ceiling shall not exceed that for base grade (No. 1).

CAST IRON SCRAP

Ceiling price per gross ton for following grades shall be f.o.b. shipping point:

Cast Iron:

1. No. 1 (Cupola)	$49.00
2. No. 2 (Charging Box)	47.00
3. No. 3 (Hvy. Breakable)	45.00
4. No. 4 (Burnt Cast)	41.00
5. Cast Iron Brake Shoes	41.00
6. Stove Plate	46.00
7. Clean Auto Cast	52.00
8. Unstripped Motor Blocks	43.00
9. Wheels, No. 1	47.00
10. Malleable	55.00
11. Drop Broken Machinery	52.00

Restrictions on Use

(1) Ceiling shipping point price which a basic open-hearth consumer may pay for No. 1 cast iron, clean auto cast, malleable or drop broken machinery cast shall be ceiling price for No. 3 cast iron.
(2) Ceiling shipping point price which any foundry other than a malleable iron producer may pay for Grade 10 shall be ceiling price for No. 1 cast iron.

Preparation Charges

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of dealer or industrial origin authorized by OPS are:

(1) For preparing into Grades No. 1, No. 2 or No. 3, $8.
(2) For hydraulically compressing Grade No. 4, $6 per ton; Grade No. 5, $8.
(3) For crushing Grade No. 6, $3.
(4) For preparing into Grade No. 25, $6.
(5) For preparing into Grade No. 19, $6.
(6) For preparing into Grades No. 12, No. 13, No. 14, No. 16, or No. 20, $10.
(7) For preparing into Grade No. 17 or Grade No. 21, $11.
(8) For preparing into Grade No. 18 or Grade No. 20, $12.
(9) For hydraulically compressing Grade No. 15, $8.
(10) For preparing into Grade No. 28, $10.

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of railroad origin shall be:
(1) For preparing into Grade No. 1 and Grade No. 2, $8.
(2) For hydraulically compressing Grade No. 13, $6.
(3) For preparing into Grade No. 16, $4.
(4) For preparing into Grade No. 17, $5.
(5) For preparing into Grade No. 18, $7.
(6) For preparing into Grade No. 21, $4.
(7) For preparing into Grade No. 23, $4.

Ceiling fees per gross ton which may be charged for intransit preparation of cast iron are limited to:
(1) For preparing Grade No. 8 into grade No. 7, $9.
(2) For preparing Grade No. 3 into Grade No. 11, $7.
(3) For preparing Grade No. 3 into Grade No. 1, $4.

Whenever scrap has arrived at its point of delivery and consumer engages a dealer to prepare such scrap, no fee may be charged for such services unless consumer obtains prior written OPS approval.

Commissions

No commissions shall be payable to a broker in excess of $1.

Unprepared Scrap

For unprepared scrap, other than materials suitable for hydraulic compression, ceiling basing point prices shall be $8 per ton beneath ceiling of the prepared base grades.

For unprepared material which when compressed constitutes No. 1 bundles, ceiling basing point price shall be $6 per ton beneath ceiling for No. 1 bundles; or when compressed constitutes No. 2 bundles ceiling basing point price shall be $8 beneath ceiling basing point price for No. 2 bundles.

Premiums for Alloy Content

No premium may be charged for alloy content except: $1.25 per ton for each 0.25% of nickel where scrap contains not less than 1% and not over 5.25% nickel; $2 per ton for scrap containing not less than 0.15 per cent molybdenum and $3 for scrap containing not less than 0.65% molybdenum; for scrap containing not less than 10% manganese, $4 for scrap in sizes larger than 12 x 24 x 8 in., and $14 for scrap cut in that size or smaller (applicable only if scrap is sold for electric furnace uses or on NPA allocation); $1 for scrap conforming to SAE 52100.

Switching Charges

Switching charges to be deducted from basing point prices of dealer, industrial and nonoperating railroad scrap, to determine ceiling shipping point prices for scrap originating in basing points are per gross ton:

Alabama City, Ala., 43c; Ashland, Ky., 47c; Atlanta, 51c.
Bethlehem, Pa., 52c; Birmingham, 50c; Brackenridge, Pa., 53c; Buffalo, 83c; Butler, Pa., 65c.
Canton, O., 51c; Chicago (including Gary, Ind.), $1.34; Cincinnati (including Newport, Ky.), 65c; Claymont, Del. (including Chester, Pa.), 79c; Cleveland, 76c.
Coatesville, Pa., 50c; Conshohocken, Pa., 26c.
Detroit, 95c; Duluth, Minn., 50c.
Harrisburg, Pa., 51c; Houston, Tex., 57c.
Johnstown, Pa., 75c.
Kansas City, Mo., 78c; Kokomo, Ind., 51c.
Middletown, O., 26c; Midland, Pa., 75c; Minnequa, Colo., 33c; Monessen, Pa., 51c.
Phoenixville, Pa., 51c; Pittsburg, Calif., 65c; Pittsburgh (including Bessemer, Homestead, Duquesne, Munhall), 99c; Portland, Oreg., 52c; Portsmouth, O., 51c.
St. Louis (including Federal, Granite City, E. St. Louis, Madison, Ill.), 51c; San Francisco (including So. San Francisco, Niles, Oakland), 66c; Seattle, 59c; Sharon, Pa., 75c; Sparrows Point, Md., 26c; Steubenville, O., 51c.
Warren, Pa., 75c; Weirton, W. Va., 70c.
Youngstown, 75c.

HAMILTON, ONT.
(Delivered Prices)

Heavy Melt.	$35.00
No. 1 Bundles	35.00
No. 2 Bundles	34.50
Mechanical Bundles	33.00
Mixed Steel Scrap	31.00
Mixed Borings, Turnings	28.00
Rails, Remelting	35.00
Rails, Rerolling	38.00
Busheling	29.50
Bushelings new factory, prep'd	33.00
Bushelings new factory, unprep'd	28.00
Short Steel Turnings	28.00
Cast Iron Grades*	
No. 1 Machinery Cast	58.00-60.00

* F.o.b. shipping point.

The Metal Market

Shortages of copper and zinc force some mills to curtail operations. Higher prices needed to stimulate production, some interests claim. Complete metal allocation may be necessary

JUNE will be a critical month for the metalworking industry. In the final month of operations prior to inauguration of CMP, users of copper will experience an acute shortage of the metal and may have to pay a higher price. At the same time, supplies of zinc for nondefense uses continue to shrink.

Metals other than copper, aluminum and steel will have to be put under complete allocation in order to support the Controlled Materials Plan. This is the opinion of W. W. Hopton, director, Tin, Lead and Zinc Division, NPA. Zinc and other metals will have to be directed to approved programs in order that they be fulfilled and the remainder distributed to essential civilian uses. Mr. Hopton also believes it possible that some conservation orders may be found necessary.

The shortage of copper and zinc forced American Brass Co. to suspend operations in all of its plants in this country from May 30 to June 4. This action was taken to give the company an opportunity to replenish working stocks of those metals. The casting mill of Scovill Mfg. Co. was idled recently for the same reason.

Wants Price Boost—The price of domestic copper must be increased if the United States copper industry is to operate efficiently, said Endicott T. Lovell, president, Calumet & Hecla Consolidated Copper Co., Boston. "With Chilean copper being imported at 27.50c a pound and high grades of copper scrap selling for 33.50c a pound, it is obvious that the government's ceiling price of 24.50c for domestic refined copper is unsound," he added. The zinc industry too is faced with the problem of a government price ceiling that makes new and expanded production difficult. Mr. Lovell said "additional production of zinc to meet the requirements of our defense program can be made available if the government provides the necessary financial assistance as well as the assurance that the zinc price will remain high enough to make operations economically sound."

C. Donald Dallas, chairman, Revere Copper & Brass Inc., favors raising the domestic price of copper to the world level of 27.50c a pound. Until the domestic price of copper is brought up to the world level there can be little hope of halting the syphoning out of copper from this country's normal sources of supply, which causes industrial curtailment and unemployment, he said.

Problems of providing the metalworking industry with sufficient raw materials to maintain production of defense and defense-supporting items until CMP becomes fully effective are similar to those encountered by the brass and bronze foundries. NPA is considering an allocation order that would control the distribution of the materials used by that industry.

Brass may be used for functional parts of flashlights, but not for cases under copper conversion order M-12. Yet nearly 80 per cent of cases produced are fabricated from brass because of non-corrosive and nonmagnetic properties of that metal. Industry asks that flashlights be programmed under CMP and brass allotted. If not, manufacturers of cases urge that enough brass be permitted to maintain minimum operations until industry converts to steel. From four to six months will be required for conversion to steel from brass; new annealing equipment and some retooling for drawing of steel will be necessary.

Machinery makers and other users of high-grade zinc will have to get along with somewhat less of the metal in the third quarter than they had in the second. Civilian users will not be permitted in the third quarter to use over 70 per cent of the special high grade slab zinc they used in the average of the first two quarters of last year. They were restricted to 80 per cent in the second quarter. At the same time, producers of high grade zinc must set aside for defense use 20 per cent of their scheduled monthly production instead of 10 per cent previously required. Producers and importers of slab zinc must set aside in June 5 per cent of their monthly production and imports as a special reserve to meet emergency demands.

Lack of zinc is showing up more in process and specification changes. In production of door locks and latches an interesting postwar development has been increased use of die-castings, including escutcheon plates. Shortage of zinc is now pushing part of this die-casting volume back to cast iron.

Nickel Advances Six Cents

International Nickel Co. of Canada Ltd. advanced the price of nickel 6 cents a pound in United States currency, effective June 1. The new export price of electrolytic nickel, including the 1.25-cent import duty, is 56.50c a pound, f.o.b. Port Colborne, Ont., refinery. The price to Canadian consumers is 58.50c a pound in Canadian currency. The advance is made necessary, the company says, by an addition of $15 million a year in production costs arising from new union agreements and higher costs for materials and supplies.

NPA Amends Lead Order

Order M-38 as amended increases the required acceptance of defense-rated orders by dealers from 20 to 25 per cent of the quantity of lead available to him each month. Primary refiners must set aside 5 per cent of their anticipated monthly production of pig lead to meet requirements of "hardship" cases.

Wants More Aluminum Capacity

Construction of new facilities to increase aluminum production capacity 188,000 tons a year is recommended by Oscar L. Chapman, secretary of the interior. The expansion of 188,000 tons will bring total certified capacity to 713,000 tons a year of expanded production, including 446,000 tons certified on Dec. 11, 1950, and 79,000 tons in reactivated plants.

ALLOY AVENUE: These alloy stock piles, at Electro Metallurgical Co.'s mile-long plant at Alloy, W. Va., are at new lows, a result of the current emergency. The Union Carbide & Carbon Co. subsidiary produces more than 50 different alloys and alloying metals

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 24.50c, Conn. Valley; Lake 24.62½c, delivered.

Brass Ingots: 85-5-5-5 (No. 115) 29.00c; 88-10-2 (No. 215) 44.50c; 80-10-10 (No. 305) 35.00c; No. 1 yellow (No. 405) 25.50c.

Zinc: Prime western 17.50c; brass special 17.75c; intermediate 18.00c, East St. Louis; high grade 18.85c, delivered.

Lead: Common 16.80c; chemical 16.90c; corroding 16.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 19.00c, pigs 18.00c. Base prices for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb c.l. orders.

Secondary Aluminum: Piston alloys 30.75-32.50c; No. 12 foundry alloy (No. 2 grade) 30.75-31.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 32.75-33.50c; grade 2, 30.00-31.50c; grade 3, 30.00-30.50c; grade 4, 28.50-30.00c. Prices include freight at c.l. rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt 139.00.

Antimony: American 99-99.8% and over but not meeting specifications below 42.00c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 42.50c; f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 50.50c; 25-lb pigs, 53.15c; "XX" nickel shot, 54.15c; "F" nickel shot or ingots, for addition to cast iron, 51.00c. Prices include import duty.

Mercury: Open market, spot, large lots, New York, $215-$220 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $1.56 per lb of alloy, f.o.b., Reading, Pa.

Cadmium: "Regular" straight or flat forms, $2.55 del.; special or patented shapes $2.80.

Cobalt: 97.99%, $2.10 per lb for 500 lb (kegs); $2.12 per lb for 100 lb (case); $2.17 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York 90.16c per oz.

Platinum: $90-$93 per ounce from refineries.

Palladium: $24 per troy ounce.

Iridium: $200 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; effective May 23, 1951)

Sheet: Copper 40.18; yellow brass 37.28; commercial bronze, 95% 40.18; 90% 39.78; red brass, 85% 38.86; 80% 38.47; best quality, 38.07; nickel silver, 18% 50.99; phosphor-bronze grade A, 5% 59.42.

Rod: Copper, hot-rolled 36.03; cold-drawn 37.28; yellow brass free cutting, 31.70; commercial bronze, 95% 39.87; 90% 39.47; red brass 85%, 38.55; 80% 38.16.

Seamless Tubing: Copper 40.22; yellow brass 40.29; commercial bronze, 90% 42.44; red brass, 85% 41.77.

Wire: Yellow brass 37.57; commercial bronze, 95% 40.47; 90% 40.07; red brass, 85% 39.15; 80% 38.76; best quality brass, 38.36.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 28.67-30.295; l.c.l. 29.17-30.92; 100,000 lb lots 28.545-30.295; weatherproof, f.o.b. eastern mills, c.l. 30.10, l.c.l. 30.18, 100,000 lb lots 29.35; magnet, del., 15,000 lb or more 34.50, l.c.l 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders.)

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	...	...
0.135-0.096	12-48	30.6	...	...
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	Round— R317-T4, 17S-T4	R317-T4	Hexagonal— 17S-T4
0.125	52.0	....	....
0.156-0.188	44.0	....	....
0.219-0.313	41.5	....	....
0.375	40.0	46.0	48.0
0.406	40.0	....	....
0.438	40.0	46.0	48.0
0.469	40.0	....	....
0.500	40.0	46.0	48.0
0.531	40.0	....	....
0.563	40.0	....	45.0
0.594	40.0	....	....
0.625	40.0	43.5	45.0
0.688	40.0	....	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	....	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	....	....
1.625	36.5	....	39.5
1.688-2.000	36.5	....	....

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 71.50c. Strip, cold-rolled, 77.50c. Rods and shapes, 67.50c. Plates, 69.50c. Seamless tubes, 100.50c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 57.00c. Strip, cold-rolled 60.00c. Rods and shapes, 55.00c Plates, 56.00c. Seamless tubes, 90.00c. Shot and blocks, 50.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

DAILY PRICE RECORD

1951	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
May 10-31	24.50	16.80	17.50	139.00	19.00	42.00	50.50	90.16
May 1-9	24.50	16.80	17.50	142.00	19.00	42.00	50.50	90.16
Apr. 17-30	24.50	16.80	17.50	142.00	19.00	42.00	50.50	90.16
Apr. 12-16	24.50	16.80	17.50	147.00	19.00	42.00	50.50	90.16
Apr. 9-11	24.50	16.80	17.50	150.50	19.00	42.00	50.50	90.16
Apr. 6-7	24.50	16.80	17.50	150.00	19.00	42.00	50.50	90.16
Apr. 5	24.50	16.80	17.50	149.875	19.00	42.00	50.50	90.16
Apr. 4	24.50	16.80	17.50	150.00	19.00	42.00	50.50	90.16
Apr. 3	24.50	16.80	17.50	149.50	19.00	42.00	50.50	90.16
Apr. Avg.	24.50	16.80	17.50	145.735	19.00	42.00	50.50	90.16
Mar. Avg.	24.50	16.80	17.50	145.730	19.00	42.00	50.50	90.16
Feb. Avg.	24.50	16.80	17.50	182.716	19.00	42.00	50.50	90.16
Jan. Avg.	24.50	16.80	17.50	171.798	19.00	35.462	50.50	88.890

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime west, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked. Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.

Copper Anodes: Base 2000 to 5000 lb, f.o.b. shipping point, freight allowed: Flat, untrimmed 37.69c; oval 37.19c. Cast 37.37c, delivered in eastern territory.

Copper Cyanide: 70-71% Cu, 100-lb drums, 1000 lb 60.5c, under 1000 lb 62.5c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98% ½-oz ball, in 200 lb drums, 1 to 900 lb, 19.00c; 1000 to 19,900 lb 18.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu, 50 lb bags, up to 200 lb, 29.25c; over 200 lb 28.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 68.50c; 10,000 to 30,000 lb, 69.50c; 3000 to 10,000 lb, 70.50c, 500 to 3000 lb 71.50c, 100 to 500 lb, 73.50c; under 100 lb, 76.50c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 35.00c; 400-lb bbl. 33.00c up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, $1.55; 500 to 999 lb, $1.555; 200 to 499 lb, $1.56; less than 200 lb, $1.575. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 49.40c; 100 or 600 lb drums only, 100 to 500 lb, $1.20c; 700 to 1900 lb, 78.90c; 2000 to 9900 lb, 77.30c. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more drums, 45.7c, f.o.b. Niagara Falls, N. Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl less than 2000 lb $1.2086; more than 2000 lb $1.1886. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Stannous Chloride (Anhydrous): In 400 lb bbl $1.0919; 100 lb kegs $1.1019. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 20,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	23.00	23.00	22.25
Yellow Brass	20.125	19.875	18.75
Commercial Bronze			
95%	21.875	21.625	21.125
90%	21.75	21.50	21.00
Red Brass			
85%	21.50	21.25	20.75
80%	21.375	21.125	20.625
Muntz metal	19.00	18.75	18.25
Nickel, silver, 10%	22.25	22.00	11.125
Phos. bronze, A	24.00	23.75	22.75

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 30.00; No. 2 copper 28.00; light copper 27.00; composition red brass 25.50-26.00; radiators 20.50-21.00; heavy yellow brass 20.00-20.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; refinery brass (60% copper) per dry copper content 20.00.

* Nominal.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 25.50-26.50; No. 2 24.00-25.00; light copper 22.00-22.50; No. 1 composition red brass 22.00-23.00; No. 1 composition turnings 21.00-22.00; mixed brass turnings 13.00; new brass clippings 20.00-21.00; No. 1 brass rod turnings 19.00; light brass 15.00; clean heavy yellow brass 17.50; new brass rod ends 19.50; auto radiators 17.50-18.00; cocks and faucets, 19.00-19.50; brass pipe 20.00-20.50.

Lead: Heavy 16.50-16.75; battery plates 9.50-10.00; linotype and stereotype 17.00; electrotype 15.75-16.00; mixed babbitt 17.00.

Zinc: Old zinc 12.50-13.00; new die cast scrap 12.50-13.00; old die cast scrap 8.25-8.50.

Tin: No. 1 pewter 80.00-85.00; block tin pipe 110.00-120.00; No. 1 babbitt 70.00-75.00.

Aluminum: Clippings 2S 21.50-22.00; old sheets 17.00-17.50; crankcase 17.00-17.50; borings and turnings 13.00-14.00.

Plates . . .

Plate Prices, Page 165

Boston—While most mills will get out in June a substantial part of unrated tonnage already booked, only DO or directive orders are likely to be filled for July shipment. Heads for both June and July will be reduced in volume with new tonnage confined to DO orders. Most mills are well behind schedules on heads. In clad plates, most mills have only straight chromium grades available in about 10 weeks. Fore River yard, Bethlehem Steel Co., booked a 29,000-ton tanker, largest ever undertaken at that yard.

Pittsburgh—Demand pressure for light and heavy plates continues at a high level. With set-asides, M-1 and M-6 requirements taking almost the entire production of one seller for July, the non-rated user will be hard pressed to get any tonnage. DO set-asides have been reserved in some cases through fourth quarter.

Philadelphia—Starting second quarter, distribution of plates by directive will all but eliminate volume to fabricators without priorities.

Chicago—Directives against plate production have mounted steadily until by July consumers lacking ratings will find virtually no free tonnage available.

Sheets, Strip . . .

Sheet and Strip Prices, Page 165 & 166

Pittsburgh—July shipments of hot-rolled sheets to non-rated consumers will be small. One producer here has no hot-rolled to offer the civilian market. With DO set-asides of 55 per cent, M-1 and M-6 requirements in addition, and the normal tonnage removed for further processing, the lack of "free" hot-rolled sheets is understandable. Cold-rolled sheets are in somewhat better supply with defense requirements taking 40 per cent and defense support effort requiring about 40 per cent. An estimated 20 per cent of production will be available to non-rated purchasers but July schedules have not yet been set because of the decrease in lead-time.

Cleveland—No particular change in sheet market conditions in this area is expected until the Controlled Materials Plan is in operation. Quotas for July are being set up but increased set-asides on defense and related account place additional limits on the tonnage available to unrated consumers. Further cutbacks in "free" tonnage are likely over the summer especially since some production may be lost through vacation interruptions.

Boston—Establishment of third quarter allocation for cold-rolled strip converters at 90 per cent, base period, first nine months of 1950, includes some directly rated volume which extended into fourth quarter. Although demand for flat-rolled is in excess of supply and unrated consumers are pinched for tonnage, some consumer lines are slowing down.

Philadelphia—Flat-rolled steel consumers are not too successful in moving rated defense tonnage forward for July and August delivery under increased set-asides for those months.

Cincinnati—July schedules of sheet mills disclose further inroads for

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rated tonnage. Mills are hesitant to book DO orders for distant delivery.

Chicago—Indications are cold-rolled sheets in the free catagory will be about the same in July as in June. In case of one producer this will be about one-half the tonnage in the typical month of fourth quarter last year. Galvanized sheets stand in about the same position. Outlook is not so promising for hot-rolled sheets.

St. Louis—Sheet supplies in the free market grow scarcer as the district's rated demand increases. Nonessential consumers here, such as outdoor sign manufacturers, are acutely short with little prospect of relief. Farm equipment, another big consumer in this area, is getting moderately good tonnage with government help. Granite City Steel has completed a check of customers' certifications and learned rated orders will take approximately 50 per cent of its sheet output in July compared to 44 per cent in May.

Steel Bars . . .

Bar Prices, Page 165

Cleveland—Defense requirements for bars in the various categories is putting steadily increasing strain on supply. July set-asides for defense and defense-support account are larger and expectations are still further increases will be made in these set-asides for August. Further cuts in quotas to unrated consumers are in prospect. There is little chance for any substantial supply relief on civilian account for some months ahead.

Boston—Increase in carbon bar tonnage set-aside has moved little tonnage ahead of original schedule. On alloys some producers are booked into October. Reduction of lead-time on carbon bars to 30 days resulted in some delays in setting up programs for July.

Philadelphia—Before warehouse and other programs are adjusted for July, tonnage due converters under the 90 per cent allocation for the base period will be assigned space. Coupled with shorter lead-time carbon bar schedules are delayed.

Pittsburgh—Increase in DO set-asides to 55 per cent for hot rolled bars and 50 per cent for cold-finished bars in July will cut deeply into the dwindling tonnage for non-rated users. Projectile and shell quality bars under 3 in. round or square are included in the 55 per cent whereas hot-rolled bars and billets over 3 in. round or square of projectile and shell quality will be provided in the future by production directives. Increases in the hot-rolled bar set-aside will be felt by the non-integrated cold finished producers whose supply under M-1 is set at 90 per cent minimum of base period, but who may not receive their quota in face of the defense demands. Alloy bars are virtually unobtainable.

Chicago—Because of the magnitude which NPA set-asides for DO orders have assumed plus directives for defense support programs, warehouses, agricultural implements, and the like, there will be no free tonnage for bars in July. Shell steel as yet cuts a small figure in mill schedules.

Seattle — Bar mills are refusing considerable business, unable to meet time schedules. Backlogs will carry them into fourth quarter.

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Structural Shapes . . .

Structural Shape Prices, Page 165

Boston—Low bids on steel curbing and rail, hand-rail and gutter won contract for the superstructure, 4500 tons, for American Bridge Co. embankment road connection, Boston Central Artery. Bethlehem Steel Co. was low on structural steel at 25.20c per pound in place for structural steel for bents against 27.15c; 20.10c against 20.14c, structural steel for flooring and bracing; and 28.30c on silicon steel for bends compared with 28.73c. Of the total, 425 tons are silicon.

Philadelphia—Inability to obtain structural material is forcing most fabricating shops to limit estimates mostly to rated projects. Bridge inquiry has subsided.

Pittsburgh—Fabricators holding unrated orders will be nearly out of operation in late third quarter. Demand here far outstrips production capacity and with the increase of DO set-asides to 68 per cent plus industrial construction, there is little chance for tonnage for the civilian fabricator. Slight demand decrease is expected in third quarter.

Seattle — Several large shape awards for Alaska projects are pending. Some business has been placed with southern firms. Inquiry continues active.

Wire . . .

Wire Prices, Page 167

Boston—Subcontracting is well below expected peak in defense work and some wire producers are below set-aside limitations for both low and high carbon wire. Buying for aircraft is under peak with pilot orders still being placed. Wire for fuze springs is moving in limited volume.

Tubular Goods . . .

Tubular Goods Prices, Page 169

Boston—Consumers on direct shipments are in some cases successful in advancing rated tonnage to July and August as the result of increased set-aside for merchant steel pipe. Plumbing and heating requirements are slackening but most distributors are taking in June and July allocations to build inventory.

Dallas, Tex.—Lone Star Steel Co. reports movement of its first foreign shipment of cast iron pressure pipe. The pipe was sold to the Puerto Rico aqueduct authority. The shipment is valued at more than $100,000.

Seattle—No major cast iron projects are up for bids. Delivery schedules are six to eight months behind.

Warehouse . . .

Warehouse Prices, Page 171

Pittsburgh—Distributors here expect increased receipts this month in line with recent M-6 amendment. Inventories here are practically nonexistent with heavy demand pressure for all products. Bars, all types, are in shortest supply. Structurals and plates are nearly as difficult to obtain.

Philadelphia—Deliveries under warehouse allocations are slightly heavier but tonnage includes some slow moving items. Plates, structurals, bars and galvanized sheets are short and move to consumers without going into stock.

Cleveland—This month should see the warehouse stock position materially improve. At any rate, distributors are confident they will receive substantially larger tonnage from the mills under the terms of amended NPA order M-6 assuring them 85 per cent of their tonnage receipts in the base period.

Cincinnati—Steel distributors are looking to June for better mill shipments. Inquiries for structural steel have dwindled.

Seattle — Warehouses are making every effort to distribute available supplies fairly among regular customers. Increased seasonal demands from the canning and construction industries are noted.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 169

Pittsburgh—Demand for oven foundry coke is matched evenly with supply. Enough of this grade is available to satisfy operating demands but not enough is obtainable to permit building inventories.

Cleveland—Oven coke has been flowing to this area from other producing points in somewhat better volume lately. As a result coke supply conditions are a little improved. However, the foundries are anxious

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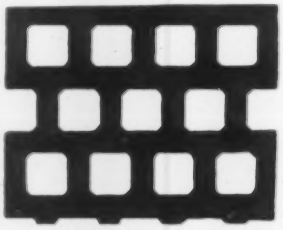

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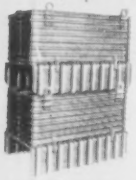

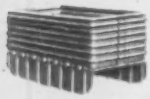

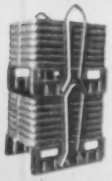

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to take in as much tonnage as possible and the pressure on suppliers is not particularly easier. Expectations are slackening in civilian goods production will be reflected in foundry activities pending placement of a larger volume of defense castings orders. Slackening should permit some replenishment of raw material inventories.

Rails, Cars . . .

Track Material Prices, Page 167

Pittsburgh—Sessions in Washington are aimed at raising the freight car quota for July back to 10,000 cars. It had been set at 7600. May production of freight cars is estimated at 9500 and 10,000 cars are expected in June. Production lines are now filled and manpower is fully trained to carry forth construction of this equipment.

Scrap . . .

Scrap Prices, Page 172

Detroit—Slowdown in metalworking activity in this area is reflected in lessening scrap receipts by mills. The sag appears to be almost across the board, and slowing up of screw machine operations has tightened the supply of turnings. OPS inspectors working here are reported to have downgraded several cars of scrap.

Boston—Dealer allocations of heavy melting steel are limited. Yard stocks are in no condition to stand up under heavy allocation without depletion and incoming volume of heavy melting is lagging for this period.

Buffalo—Heavy movement of scrap by water continues, three additional barge fleets arriving last week. But the mills are still unable to add any appreciable tonnage to depleted reserve stocks.

Philadelphia—Allocations keep railroad and industrial scrap off the market to a large extent. Directed withdrawals from yards are not as heavy, but in view of limited inventories and not too impressive collections this is a contributing factor on reserves in sight.

Pittsburgh—Seasonal increases in scrap movement have been overshadowed by the record-breaking operations here. This gives the impression that scrap is abundant but mill inventories show the error in this. Operations have been at expense of stocks.

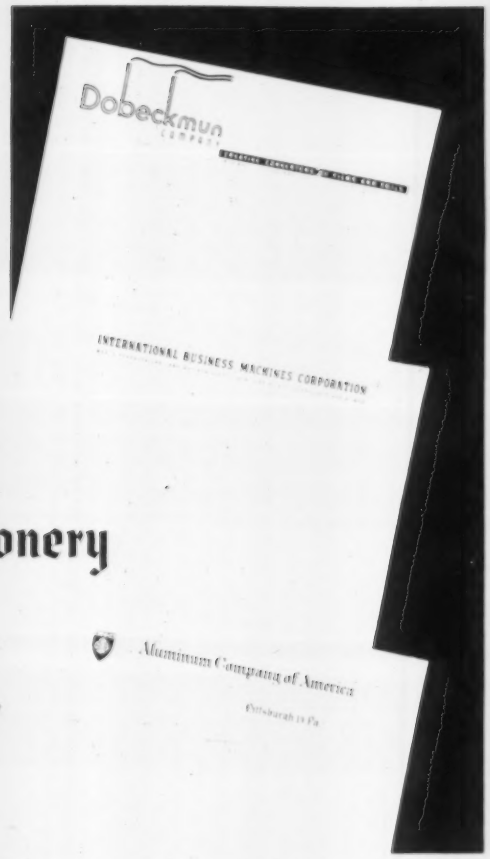
Cincinnati—Collections slowed last week. Quality of some shipments is not as customary. Mill inventories are below desired levels.

Chicago—Steelmakers are losing inventory day-by-day. Tonnage is not available to support steelmaking at around 107 per cent of capacity. Springboard prices and long freight hauls make distant scrap figure $10 to $15 over local material.

St. Louis—Mill scrap stocks have sunk so low another mill last week was able to get its first dealer allocation. More applications are going in to Washington in anticipation of further seasonal shortages due to factory vacation periods, increased farming activity and hot weather lag.

Seattle—L. G. Knight, district purchasing manager, Bethlehem Pacific Coast Steel Corp. has been named area chairman of the Scrap Mobilization Committee.

Nothing compliments a business so well as a letter well written on well styled stationery.



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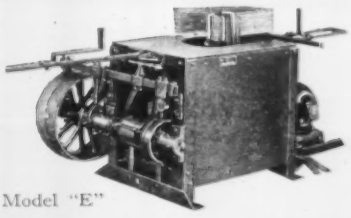

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Pig Iron Suppliers Under Pressure

Foundry operations sustained on high level but some shops operate on hand-to-mouth iron inventories. Formal allocation appears closer

PIG IRON allocation looms as an early possibility as stringency in supply increases. Steelmaking and foundry grades fall short of overall requirements: the situation is especially disturbing in foundry grades.

Some casting shops already confront a serious production problem. With defense demand for castings rising they are unable to accumulate satisfactory metallics inventory in the face of anticipated demand for 18 million tons of gray iron, malleable and steel castings this year.

Currently, foundries are averaging about 45 hours operations weekly. But raw material supply conditions are spotty. Some shops face constant threat of suspension. In the past normal foundry mix was considered 60 per cent scrap and 40 per cent iron. Today, shortage of pig iron has caused foundrymen to resort to larger use of scrap, the mix of some foundries now being as low as 20 per cent pig.

Trouble Ahead—To date in the emergency, castings production has been maintained through judicious apportioning of iron supplies by producers, greater use of scrap and ferroalloys, and larger consumption of imported iron. But scrap is scarce and high in price, and, currently, foreign iron sources appear drying up. Future supply prospects are darkened by plans for idling a number of blast furnaces for repairs.

All of which spells trouble for the some 3800 ferrous foundries in this country. Normally, these foundries consume 9 to 10 per cent of total pig iron production, which, this year, is running at close to a record 68-million-ton rate.

Pig iron production capacity now is rated at 72,471,780 net tons. This is an increase of 6.7 million tons since 1947 to a new all-time high. At the same time expansion plans call for increasing capacity to 79,300,000 net tons by end of 1952.

Another Argument—Controversy is shaping up over the question of iron and steel expansion. Industry men hold the nation should have capacity for 118 million net tons of steel ingots and 82.3 million tons of pig iron by July 1, 1953. Government representatives maintain 130 million tons of ingots and 95.3 million tons of pig iron will be needed. The pig iron target is intended to meet requirements of both the steel and castings industries.

ALTHOUGH foundries are using less pig iron in their melts, limited inventories give rise to supply fears in the future. Imports gave foundries a decided lift over the past months, but they're shrinking. Now plans for idling a numbr of blast furnaces spell trouble for 3800 ferrous foundries

The government goal is held impracticable by industry because steel set-asides for defense limit steel supply for facility expansion. Government men, however, point to predictions by steel executives that steel supply will be in balance possibly by fourth quarter. If true, steel for facility expansion would be more readily available.

Bulk of the foundry industry's needs is supplied by 30 merchant blast furnaces with estimated annual capacity of between 5 million and 6 million tons, including ferroalloys. The integrated steelmakers also sell some iron in the merchant market, the tonnage from these interests fluctuating from month to month in accordance with the needs for hot metal for steel ingot output.

Iron produced for sale has run as high as 9 million tons in some active years. Some merchant tonnage is basic, or steelmaking iron, but the bulk of it is for foundry use. About 85 per cent of the iron sold to the foundries is foundry and malleable grades. The remaining 15 per cent is composed of specialty irons. In the first quarter this year production of merchant iron is estimated at 1,875,000 tons, or at an annual rate of 7,500,000 tons.

Imports Give Lift—Imports have provided the foundries with a decided lift over past months. Now, this source is dwindling. Suppliers are experiencing difficulty in lining up new tonnage, chiefly because consumption abroad is increasing.

Imports in January were 133,272 net tons and in February 107,912 tons, totaling 241,184 tons. On an annual basis this rate is well in excess of the 790,371 tons imported in 1950, by far the largest on record. During World War II imports were small but in the late 30s they were substantial, ranging between 100,000 and 200,000 tons annually.

Latest data, for April, show that as of May 1 there were 176 blast furnaces operating in this country, only 8 being idle. This compares with 175 active and 9 idle on Apr. 1, and with 169 active and 14 idle on May 1 a year ago. However, the feverish pace of production over recent years necessitates early repairs to a number of stacks and projected shutdowns on this account are cause for concern among foundrymen.

At Cleveland, American Steel & Wire Co. plans to take off a stack in September for relining. U. S. Steel Co. will take off its No. 6 Gary furnace June 1 for relining, and still another in mid-July for the same reason. Crucible Steel Co. of America will close down one of its two blast furnaces at Midland, Pa., July 1 for relining and improvements. Wisconsin Steel Co. in July will blow out for relining the furnace in which it produces merchant iron. The smaller of two blast furnaces at Swedeland, Pa., is scheduled to go down for repairs the end of this month.

At the same time, several stacks now undergoing repairs are expected to be placed back in production over coming weeks. The Chester, Pa., furnace owned by the Barium Steel Corp. has been down for months, but it is in full repair and may be placed in blast by late June. Delay in blowing in this furnace has been occasioned by lack of raw materials, particularly ore.

Granite City Steel Co. recently acquired the two blast furnaces which Koppers Co. operated at Granite City, Mo., and iron customers have been notified that only half as much merchant iron will be available from these stacks as in the past.

More Defense Orders—Foundries are receiving more DO rated orders, but the total is not particularly large. They find these rated orders of little assistance in getting additional pig iron. Suppliers are adhering to a strict voluntary quota system of distribution. Growing defense demand, however, gives rise to the early possibility of more formal allocation by government control authorities, thought being that a system similar

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to that in World War II likely will be repeated. Pig iron distribution did not come under the Controlled Materials Plan during the war, consumers' needs being cared for on allocation through the Pig Iron Committee of the War Production Board. In the present emergency, if mandatory allocation is effected, it is believed it will be administered similarly, though coordinated closely with allocation of steel under the Controlled Materials Plan.

Currently, demand for castings appears less pressing in some directions. Recent production limitations on civilian durable goods is being reflected in some slackening of orders. Should the drop in civilian goods demand exceed the increase in defense volume, pressure for pig iron conceivably would ease quickly. However, no indication of such is seen as yet. In fact, slower demand for automotive castings in step with curtailed passenger car production gives signs of being taken up by increased requirements for truck castings.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PENDING

15,000 tons, forge shop and affiliated buildings for 75,000-ton and 50,000-ton presses, Wyman Gordon Co., Worcester, Mass.; Gilbane Building Corp., Providence, R. I., general contractor.

950 tons, Army warehouse and spur railroad tracks, Elmendorf air field, Alaska; M. B. Construction Co., Seattle and Anchorage, low to U. S. Engineer, $1,785,840.

785 tons, organizational maintenance shop, Fort Richardson Air Force base, Alaska; S. Birch & Sons and J. C. Boespflug Construction Co., Seattle, joint low $3,167,162 to U. S. Engineer.

458 tons, two organizational maintenance shops, Ladd and Elelson Air Force bases, Alaska; S. Birch & Sons and J. C. Boespflug Construction Co., Seattle, low, $2,415,875, to U. S. Engineer; joint and sole bid.

300 tons, Alaska Railroad shops, Anchorage, Alaska, J. B. Warrack Co., Seattle, low $815,000, second call to U. S. Engineer; to replace structure recently destroyed by fire.

262 tons, trash racks and other structures, Seattle's Ross dam; Puget Sound Sheet Metal Works, Seattle, low.

115 tons, state bridge, Lee, Mass.

REINFORCING BARS . . .

REINFORCING BARS PLACED

330 tons, building, Lowell General Hospital, Lowell, Mass., to Concrete Steel Co., Boston; Daniel Cunningham Co. Inc., Boston, general contractor; 60 tons, structural steel to Brayton-Wilson-Cole Corp., Boston.

320 tons, Orwell dam, Fergus Falls, Minn., to United States Steel Supply Co.

270 tons, staff apartment building, Medical Center, University of Illinois, Chicago, to Joseph T. Ryerson & Son Inc., Chicago; James McHugh Construction Co., Chicago, contractor.

250 tons, estimated, structurals and bars, high school, Adams, Mass., to Haarmann Steel Co., Holyoke, Mass., and Plantation Steel Co., Providence, R. I.; O. D. Purington Co. Inc., Providence, general contractor.

250 tons, Hydrocarbon Plant No. 1, Farm Creek channel improvement, East Peoria, Ill., to United States Steel Supply Co.

180 tons, Dow Chemical Co., Midland, Mich., to Concrete Steel Co., Boston.

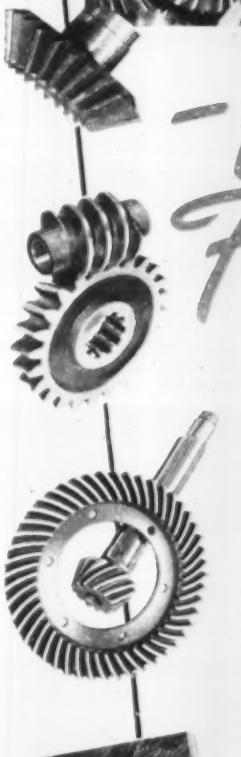
150 tons, Alaskan military construction, to Mercer Steel Co., Portland, Oreg.; Valle-Sommers Co., Seattle, general contractor.

140 tons, residence hall for men, Medical Center, University of Illinois, Chicago, to Joseph T. Ryerson & Son Inc., Chicago; James McHugh Construction Co., Chicago, contractor.

135 tons, new plant, Chain Belt Co., Milwaukee, to United States Steel Supply Co.

100 tons, Men's Hall addition, University of Illinois, Urbana, Ill., to Bethlehem Steel Co.; John Feimley Co., Bloomington, Ill., contractor.

Heat treating bevel gears in one of Fairfield's radiant tube fired rotary hearth hardening furnaces with atmosphere control.



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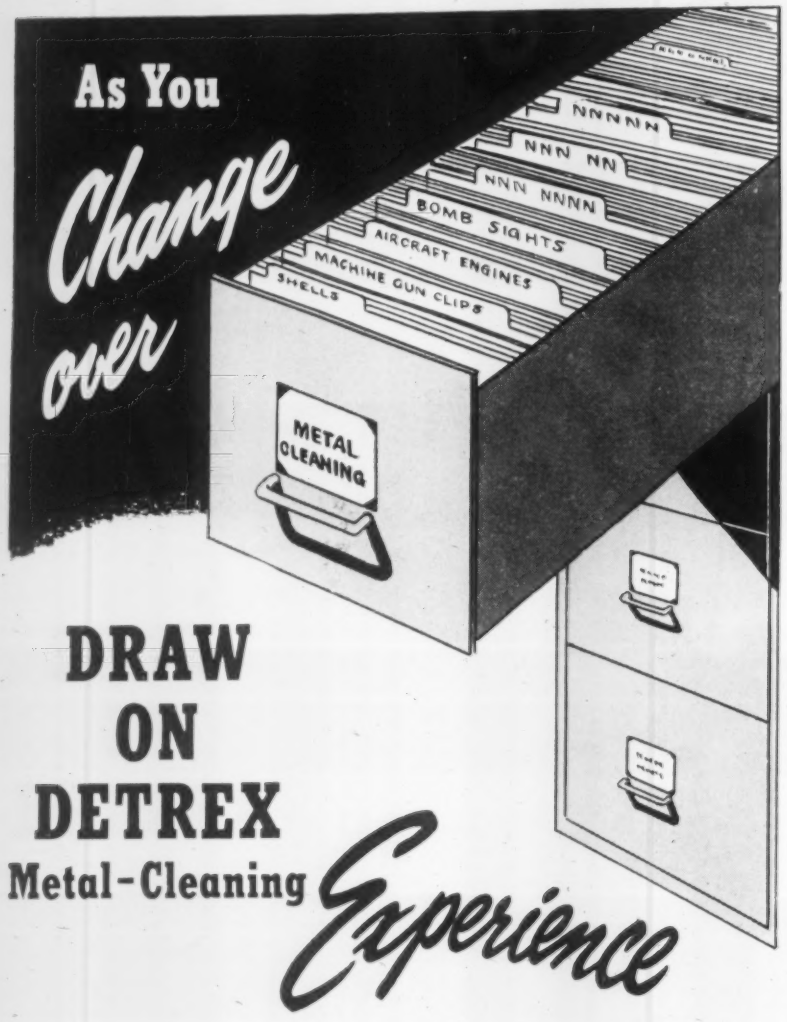

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100 tons, repairs, Commonwealth pier [illegible], Boston, to United States Steel Supply Co., Boston; James S. Kelliher, Quincy, Mass., general contractor.

REINFORCING BARS PENDING

5000 tons, including 7500 tons bars and [illegible] tons steel joists, Lake Meadows apartments, Chicago; preliminary bids June 1.

867 tons, power plant, Tinley Park, Ill.

565 tons, Resurrection Hospital, Chicago, Bell Construction Co. Inc., low on general contract.

396 tons, Tinley Park State Hospital, Tinley Park, Ill.; Walsh Construction Co., Chicago, low on general contract.

322 tons, administration buildings and dormitories, Chanute Field, Ill.; bids in.

280 tons, plant addition, Bell & Howell Co., Lincolnwood, Ill.

235 tons, O'Shaughnessy Liberal & Fine Arts Bldg., University of Notre Dame, South Bend, Ind.; McGeough Bros., St. Paul, contractor.

216 tons, water treatment plant, Tinley Park, Ill.

135 tons, Snake Creek embarkment, Riverdale, N. D.

128 tons, Bethesda Home for the Aged, Chicago.

112 tons, grade separation, Congress street superhighway, Maywood, Ill.

100 tons, sewage treatment plant, Tinley Park, Ill.

PLATES . . .

PLATES PLACED

3000 tons, ten fuel storage tanks Navy base, Mukilteo, Wash., to Chicago Bridge & Iron Co., Seattle, low $738,610 to U. S. Engineer.

PLATES PENDING

300 tons, three steel underground tanks for fuel storage, Navy air base, Whidby Island, Washington state; Coast Contractors, Seattle, low, $462,600; materials furnished by government.

200 tons or more, two elevated steel water tanks, 400,000-gallon each, Keesler Air Base, Biloxi, Miss.; bids June 7, Corps of Engineers, Mobile, Ala.

100 tons, steel water storage tank; Chicago Bridge & Iron Co., Seattle, low to Sutherlin, Oregon.

PIPE . . .

CAST IRON PIPE PLACED

1025 tons, 20 and 12 inch mains for system expansion, Corvallis, Oreg., to H. G. Purcell, Seattle for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

100 tons, 24 and 16 inch, Shirley street improvement; bids in to Tacoma, Wash., May 28.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Pennsylvania Railroad, 132 diesel locomotives, estimated cost $45 million; 12 passenger and 20 combination freight-passenger and 10 all-purpose road switcher locomotives to Electro-Motive Division, General Motors Corp., La-Grange, Ill.; 6 freight and 40 all-purpose road switcher locomotives to American Locomotive Co., New York; 14 road freight and 20 switching locomotives to Baldwin-Lima-Hamilton Corp., Eddystone, Pa.; 10 all-purpose road switcher locomotives to Fairbanks, Morse & Co., Chicago.

RAILROAD CARS PLACED

Lone Star Steel Co., Dallas, 3 mill type gondola cars, to Greenville Steel Car Co., Greenville, Pa.

Norfolk & Western, 100 covered hopper cars, to Greenville Steel Car Co., Greenville, Pa.

RAILS PENDING

Chelan County Public Utility Division, District No. 1, Wenatchee, Wash., bids for 183 tons, crane and transformer rails, also 50 tons tie plates, for expansion of Rock Island power plant, Columbia river; bids to Stone & Webster Engineering Corp., Boston, June 18.

Metalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

Ford Boosts Stamping Output

Ford Motor Co.'s new stamping plant in Buffalo will employ about 3500 workers by mid-October compared with 1400 at present, says Alton J. Hole, plant manager. Steel consumption by that time will average 2000 tons a day compared with 1400 tons at present.

Steuber Opens Warehouse

Steuber Steel Co. opened its warehouse in Ambler, Pa., a suburb of Philadelphia. The company's telephone number is Ambler 0204.

Rust Gets Furnace Order

A car-type furnace is being designed and will be built at the Chicago plant of Chicago Bridge & Iron Co. by Rust Furnace Co., Pittsburgh. The furnace will be used primarily to heat plates before pressing, and occasionally to stress relieve small assembly pieces. It will be fired by natural gas.

Sikorsky Expands Plant

Major phase of Sikorsky Aircraft Division's helicopter plant expansion is under way. The project will add 135,000 square feet of manufacturing and office space to give this division of United Aircraft Corp. a total of about 500,000 square feet at its South avenue location in Bridgeport, Conn.

Leeds Moves Boston Office

Boston office of Leeds & Northrup Co., Philadelphia manufacturer of electrical measuring instruments, automatic controls, and heat-treating furnaces, was moved to 430 Lexington Ave., Auburndale, Boston 66.

Rheem Builds in New Jersey

Rheem Mfg. Co., New York, is building a $1.5 million steel shipping container plant on Route 25, Linden, N. J. This represents the start of a contemplated expansion program expected to provide a total of 1 million square feet of manufacturing area.

PEI Studies Subcontracting

Investigation of subcontracting possibilities for porcelain enamelers is being extended by Porcelain Enamel Institute, Washington. The study includes the practicability of converting existing facilities for defense work not directly related to enameling, as well as developing increased use of porcelain enamel parts for defense work. One possibility being given particular attention is the forming or fabrication of metal parts. Most porcelain enamelers have extensive metalworking and welding setups, as well as the necessary skilled personnel, and could convert to defense work with a minimum of delay.

Lone Star Buys Slab Heater

Salem Engineering Division, Salem-Brosius Inc., Salem, O., will build an 80-ton per hour, triple-fired reheating furnace for Lone Star Steel Co.'s plant at Daingerfield, Tex. Designed to burn natural gas, the Salem slab furnace will be fully equipped with the latest in automatic controls. Erection is scheduled for the latter part of 1951.

A.C.F. Merges Traffic Units

American Car & Foundry Co., New York, merged its export traffic section of its sales department with the general traffic department. S. F. McDermott continues in charge of export traffic and in addition is assistant to the traffic manager, J. P. Krumech.

Precision Welder Moves

Precision Welder Mfg. Co. moved to larger quarters at 660 W. Grand Ave., Chicago. Installation of high-speed equipment, plus modern manufacturing methods, will enable the company to increase its output of welders sixfold.

Gear & Piston Firm Expands

Tool Steel Gear & Piston Co., Cincinnati, will have 27,000 more square feet of floor space when its machine shop and heat-treatment plant in Sharonville, O., is completed. Production at its Elmwood Place shops will be continued.

Buys Tonawanda Plant Site

Hercules Gasket & Rubber Corp., Buffalo, purchased three acres of land in Tonawanda, N. Y., as a site for a future plant.

National Seal Expanding

An addition to National Seal Co.'s plant at Van Wert, O., will add 40,000 square feet of manufacturing space to this subsidiary of National Motor Bearing Co. Inc., Redwood City, Calif. Also scheduled for the company's latest expansion are a rubber compounding building and a second floor to the present office building. The company will begin pro-

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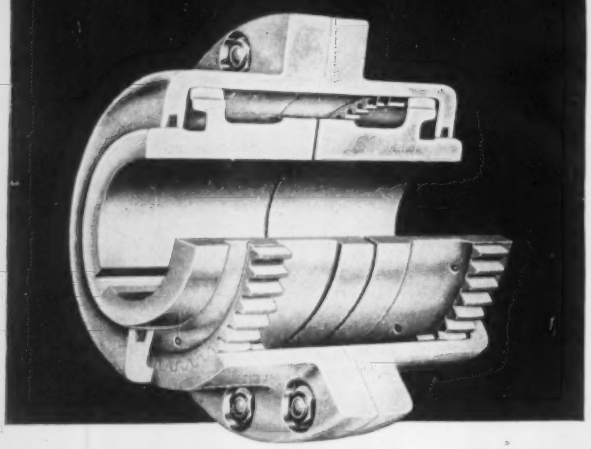

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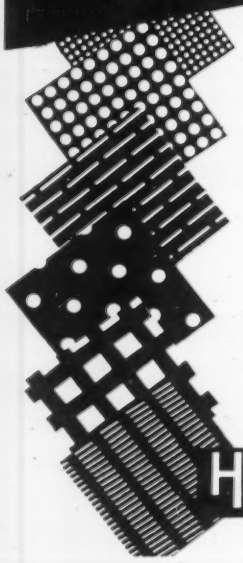

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duction soon of a new type [illegible] seal needed in large volume for military equipment and also for tractors, farm machinery, washing machines and other types of machinery. Cost of the new building and equipment is estimated at about $500,000. Building is scheduled for completion by Nov. 1.

Copco Steel To Build Plant

A warehouse and manufacturing plant will be constructed at 139th St. and Western, Chicago, by Copco Steel & Engineering Co., Detroit.

Fire Damages Scrap Yard

A scrap metal processing building of Symansky Bros. in Albany, N. Y., suffered damage estimated at about $10,000 during a recent fire. The building contained a scrap melting furnace, generators, electrical controls and other equipment.

Midland Wire Moves to South

Essex Wire Corp., Fort Wayne, Ind., acquired the former plant of Rheem Mfg. Co. at Birmingham. Essex's subsidiary, Midland Wire Corp., Tiffin, O., will produce a variety of wire specialties there. Midland will start moving in machinery and equipment immediately.

Enlarges Research Facilities

Battelle Memorial Institute,Columbus, O., is constructing a $1 million building which will house 115 unit laboratories. The building is expected to allow a 15 to 20 per cent increase in Battelle research services.

Bethlehem Reduces Accidents

Bethlehem Steel Co. has reduced accident frequency in its operations by 82 per cent as the result of a thoroughly engineered safety program of 35 years standing. The operations data cover those at steel plants, shipyards, mines and other units of the company. The company received 31 awards for safety achievements in various operations in the past year.

Foundry Damaged by Fire

Royersford Foundry & Machine Co., Royersford, Pa., suffered an estimated damage of $100,000 in a fire which burned out a foundry building recently.

Eutectic Dedicates Building

To consolidate and house existing branches of the company scattered in and about the New York metropolitan area, including the general and executive offices, and the Eutectic Welding Institute, an administration building has been constructed by Eutectic Welding Alloys Corp. at Flushing, N. Y.

New Process D-Enameling

New Process D-Enameling Corp., Chicago, will open a larger plant in Aurora, Ill., about June 15. The company's pilot plant in Chicago will continue to be operated for several months to clear up its backlog. All new equipment is being installed in the Aurora plant.

Air Valve Maker Moves

Mechanical Air Controls Inc. moved to 15311 W. Eleven Mile Rd., Royal Oak, Mich.

Celebrates 35th Anniversary

Cleveland Cap Screw Co., Cleveland, is celebrating its 35th anniversary. Started in 1916 as a partnership by J. W. Fribley and Charles M. Prell, the concern is one of the few manufacturers in this field restricting its production almost entirely to cap screws. Specialization in a wide range of sizes has been focussed on cap screws, set screws and milled studs.

Plans $3 Million Plant

A $3 million helicopter engineering and manufacturing plant is being constructed near Fort Worth, Tex., by Bell Aircraft Corp., Buffalo.

Weaver Broaching Expands

Complete facilities for broaching of parts on a job-lot or production basis have been set up by Weaver Broaching Co. in its new plant at 18515 Weaver St., Detroit.

Shipbuilding Activity Gains

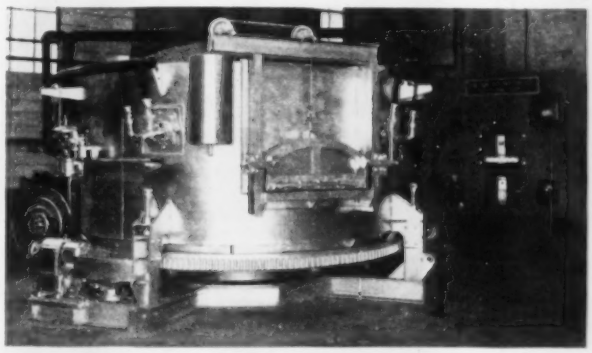
Bethlehem-Sparrows Point Shipyard Inc., Sparrows Point, Md., has under contract orders for 13 ships and is adding approximately 1000 workers to bring total employment to around 3500.

Dow Enlarges Sarnia Plant

New additions and extensions to the plant of Dow Chemical Co. in Sarnia, Ont., costing more than $250,000, will be started at once by the Austin Co., Cleveland.

Enlarges Jet Engine Project

A $300,000 factory building is being constructed by Ryan Aeronautical Co., San Diego, Calif., on a site adjacent to the company's final and subassembly buildings on Lindbergh field. It will provide space for further expansion of Ryan's jet engine components manufacturing program. More than $2 million worth of



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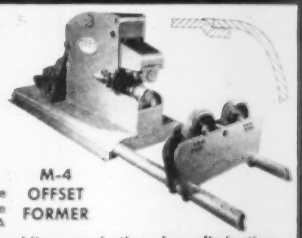

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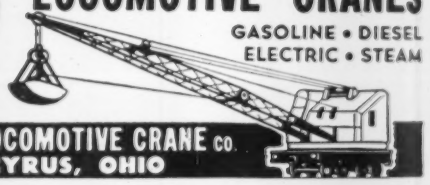

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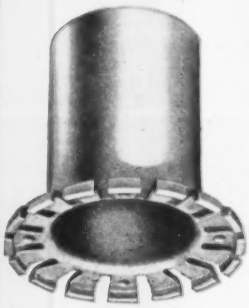

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new production machinery and other equipment, exclusive of special tooling and fixtures, will be installed in the building. Additional precision machining equipment, heavy presses, extensive welding equipment, annealing ovens and other facilities for stainless steel fabrication are included.

Welding Alloys Firm Expands

All-State Welding Alloys Co., White Plains, N. Y., is building a structure adjoining its home office and plant at 273 Ferris Ave. It will more than double the firm's factory area.

Cleco Appoints Distributor

Cleco Division, Reed Roller Bit Co., Houston, appointed House of Pfaff Inc., Long Island City 1, N. Y., as its distributor in that area. Pfaff will handle the complete lines of Cleco and Dallett air tools and accessories.

Navy Lets Building Contract

A $6,580,000 contract was awarded by the Navy to Daniel J. Cronin Inc., Newark, N. J., for construction of test facilities at the Naval Aeronautical Turbine Laboratory, Trenton, N. J. This is the largest single construction contract at the $22,750,000 laboratory. Other phases of the project are under construction.

Centric Clutch Co. Moves

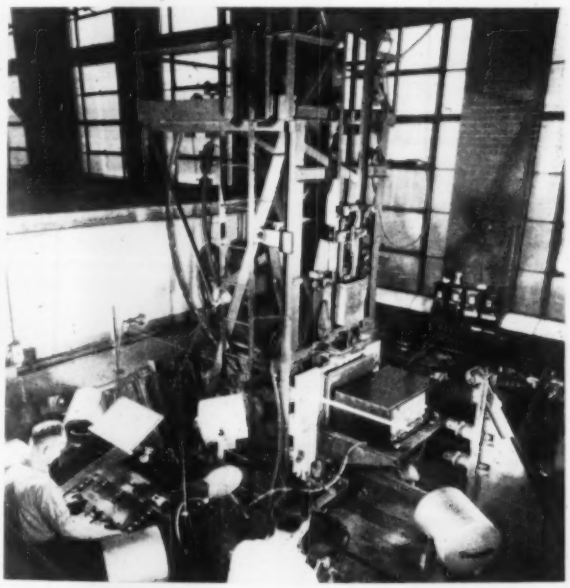
Centric Clutch Co. moved into a new building at the junction of Main street and Route 35, Woodbridge, N. J. The company makes centrifugal clutch-couplings.

McCord Corp. Buys Plant

McCord Corp., Detroit, bought the Wyandotte, Mich., property and factory buildings occupied by All Metal Products Co. on Labadie street. McCord's Gasket Division will occupy the plant Sept. 1. All Metal will continue to use part of the office space for the balance of the year.

Firms Apply for Charters

Charters of incorporation have been filed with the secretary of state's office, Dover, Del., by: Zenith Steel Products Co., $500,000 capital; Grain Processing Machinery Mfrs. Association; Western Tube Corp.; Bethlehem Steel Export Co. of Canada; Union Concrete Products Corp., machinery; Pan-American Titan Inc., machinery; Central States Metal Corp., steel and other metals, $200,000. Corporation Trust Co., Wilmington, Del., is serving as the principal office of these corporations.



SHOCKING: Jolts from 400-pound weights are rained down on a railroad radio mounted on this shock test machine in Westinghouse Electric Corp.'s engineering laboratories. One weight drops from a height of five feet and another swings in an arc to pound the back or side of the radio. A high speed motion picture camera synchronized with the falling hammer records photographically the effect on equipment under test

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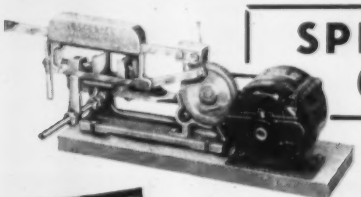
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I—Bliss 73¾C Gap Fr. Press 75 ton
I—4B BLISS Double Crank Press
I—#4½ 56 Ton Cap. BLISS PRESS 4½" Str. Dbl. Rl. Fd. Scr. Ctr. 1942
I—#304 34 Ton Cap. BLISS PRESS 8" Str. 1942
I—#74½ 90 Ton Cap. BLISS PRESS 1½" Str.
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2—25 Ton H&W POWER PRESSES 1¼" & 1½" Str. FW Dbl. Rl. Fd. Scr. Ctr.
I—45 Ton RELIANCE INCL. PRESS Sgl. Crank
2—125 Ton WTBY-FARREL COIN. PRESSES 1½" Stroke
I—15 Ton AMERICAN HYDR. STR. PRESS 20" Str. Late
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